The Tool Engineer

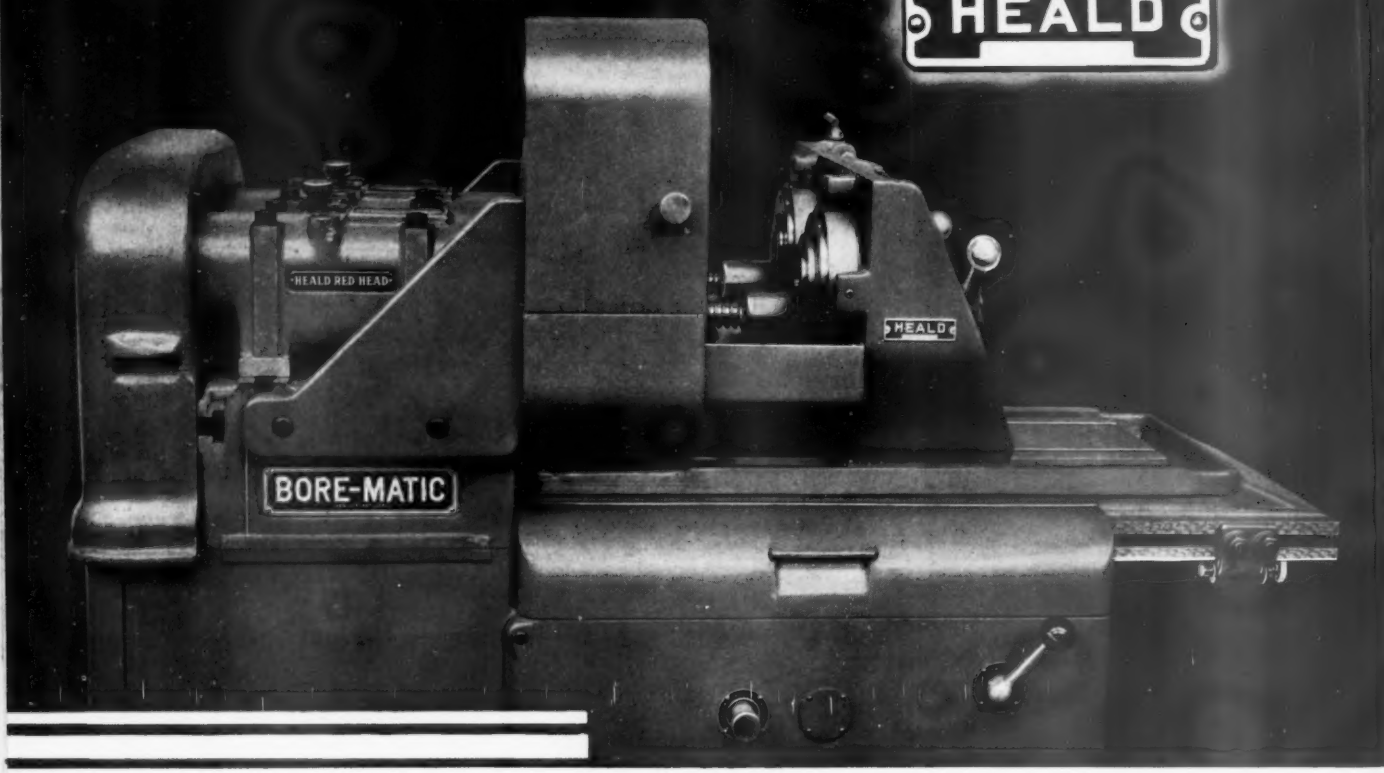
ASTE

HALLMARKS OF *Distinction*

BORE-MATIC
REG. U.S. PAT. OFF.

HEALD RED HEAD

HEALD



The Bore-Matic was designed and built especially for precision boring, facing and turning. This machine is extremely heavy and rugged in construction with single motor drive mounted on vibration dampeners, a smooth-as-velvet hydraulic drive for the table and an arrangement where, by simply changing pulleys, any desired speed for boring head can be obtained.

The self-adjusting Heald Boring Heads are making outstanding records for long life, whenever called upon for precision boring or facing, their design and construction being especially suitable for facing.

As for Heald Fixtures, a department of over fifty engineers devotes its time exclusively to the design of tools and fixtures. Fixtures that are simple, quick and easy to operate and positive in action. Fixtures that are controlled mechanically or hydraulically, to be operated manually or automatically, depending entirely on requirements.

Thus, in selecting Precision Boring Machines CONSIDER ALL THREE as ONE: **The Machine . . . Boring Head . . . Fixture.**

THE HEALD MACHINE CO., WORCESTER, MASS.

FOR CUTTING STEEL *RAPIDLY*

Haynes Stellite J-Metal tool boring SAE 6135 steel, after heat-treating, at 70 feet per minute surface speed with .009 inch feed.

• Haynes Stellite J-Metal tools are used successfully on modern production lines for many types of steel machining operations.

Pictured is one of six operations in machining SAE 6135 Steel. All six operations are done with Haynes Stellite J-Metal tools, and on every operation these J-Metal tools mean increased machining speeds, longer tool life, and lower costs.

The nearest Haynes Stellite office will be glad to analyze your production operations, and show you where Haynes Stellite J-Metal tools will increase production and reduce tool costs.

PRODUCTS OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

J-METAL HAYNES STELLITE TRADE MARK

A red-hard, wear-resisting alloy of Cobalt, Chromium and Tungsten

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

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General Office and Works—Kokomo, Indiana
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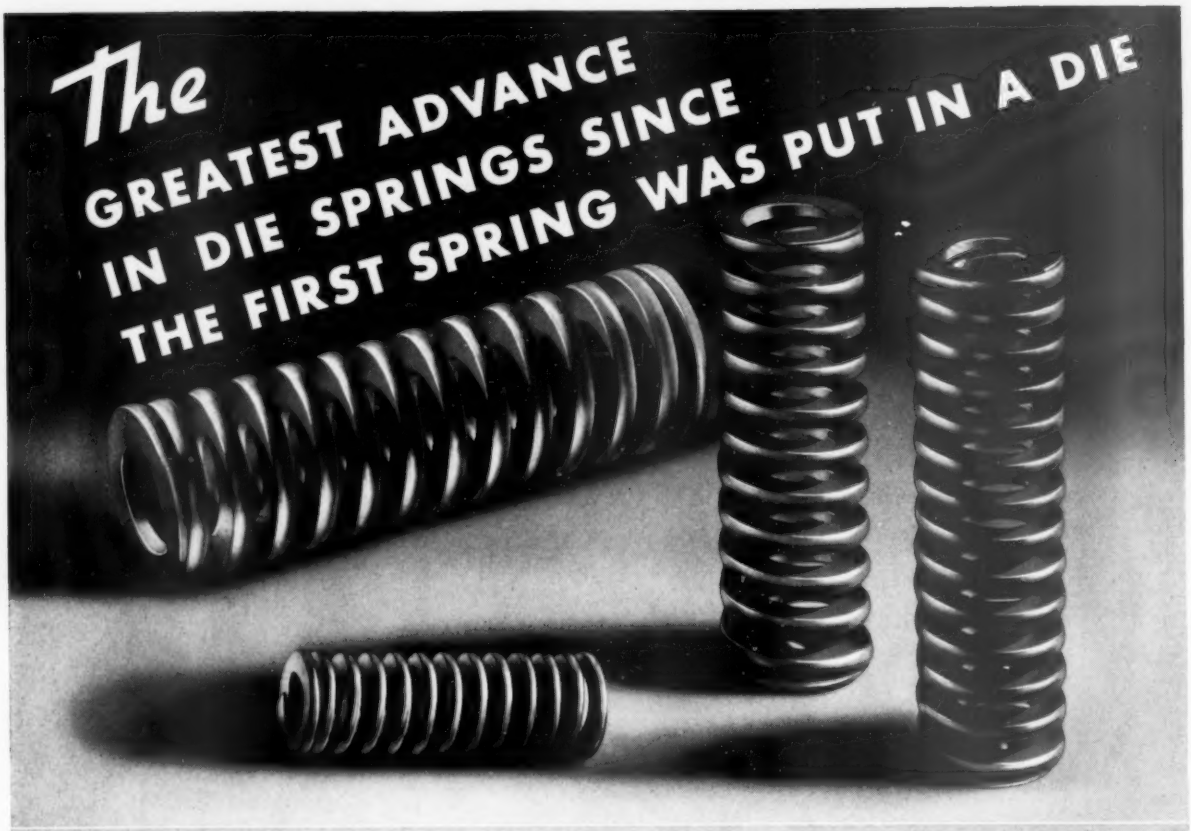
Haynes Stellite Welding Rods and information on other Haynes Stellite Products also are available through the 42 apparatus shipping points of The Linde Air Products Company



THE NEW DANLY CERTIFIED DIE SPRINGS *ARE ENGINEERED FOR LONGER LIFE*

● Now, for the first time, die springs are engineered to combine long life with maximum flexibility, carrying capacity and compression.

Stress determines the life of any spring. The stress selected for each size of the new Danly Flat Rounded Die Springs produces the highest load capacity consistent with long life. In destruction tests extending over three years with every known type of spring steel, a special analysis steel of keystone section stood out as giving the ultimate in fatigue life. The properties of this steel are controlled from the melt to the finished wire in accordance with rigid Danly specifications.

Danly Flat Rounded Die Springs are brought to the highest state of perfection by heat-treating in a continuous electric furnace equipped with three-zone furnace control, supplemented by hardening, quenching and drawing equipment, with fixed oil quenching temperature. The whole process is automatically controlled and continuously inspected to assure absolute uniformity in hardness and temper. Every Danly Die Spring is certified to carry its rated load according to chart specifications within commercial limits.

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DANLY FLAT ROUNDED DIE SPRINGS

The wire is drawn like this:

Instead of the rectangular oval wire from which die springs have been made in the past, Danly springs are drawn of special spring steel wire with keystone cross section as shown at the right.

When coiled, it takes this shape to give it greater strength, longer life:

As this keystone wire is coiled, it assumes the shape shown here with rectangular cross-section to give it equal section and equal strength on both inside and outside spring diameters; greater carrying capacity for hole size.

Send for your copy of the new Danly Spring Chart. It provides a new and authentic basis for die spring selection.

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DANLY MACHINE SPECIALTIES, Inc.
2114 South 52nd Avenue Chicago, Illinois

The Tool Engineer

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Owing to the nature of the American Society of Tool Engineers organization, it cannot, nor can the publishers be responsible for statements appearing in this publication either as papers presented at its meetings or the discussion of such papers printed herein.

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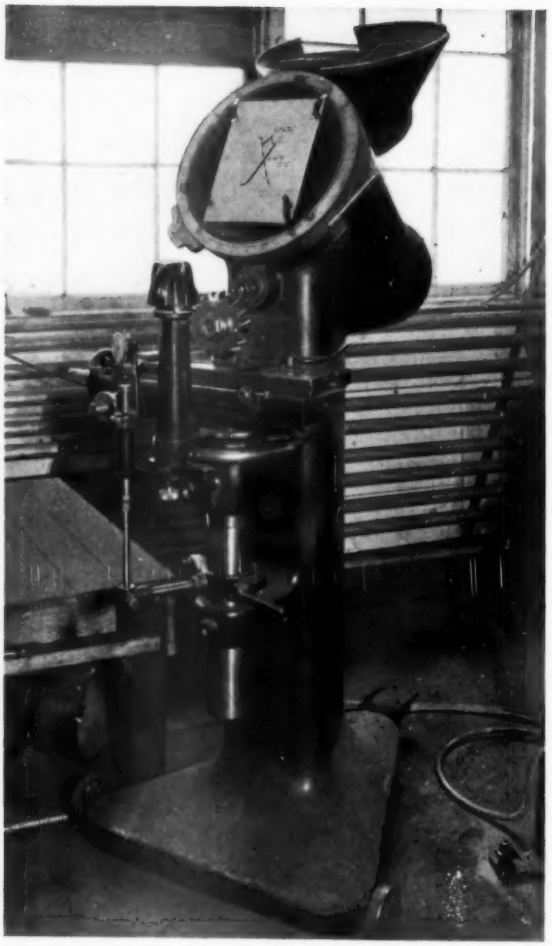
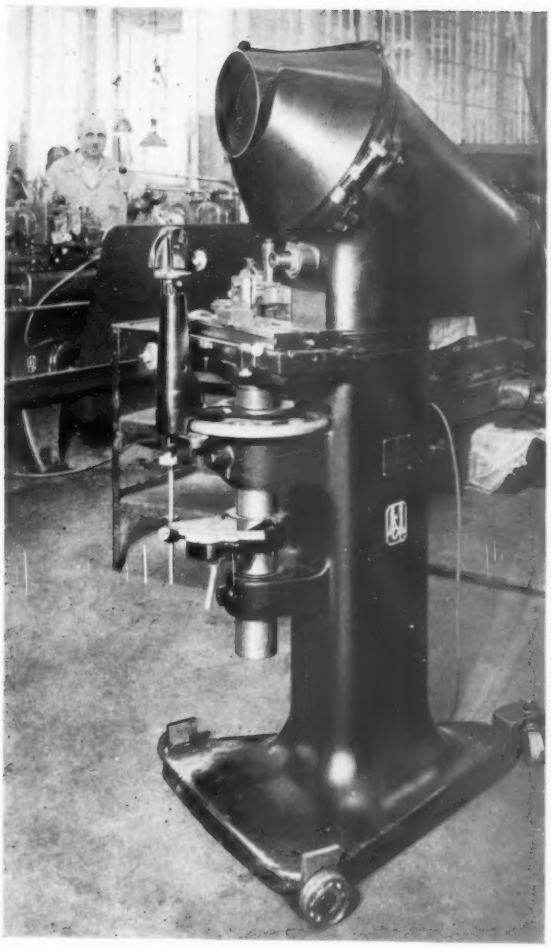
THREE APPLICATIONS



We found this Comparator in the EXPERIMENTAL DEPARTMENT. The operator was checking a form ground, non-involute shape against a master outline. This outline was drawn in their own engineering department on a sheet of bond paper, and held in place with spring hold-downs.

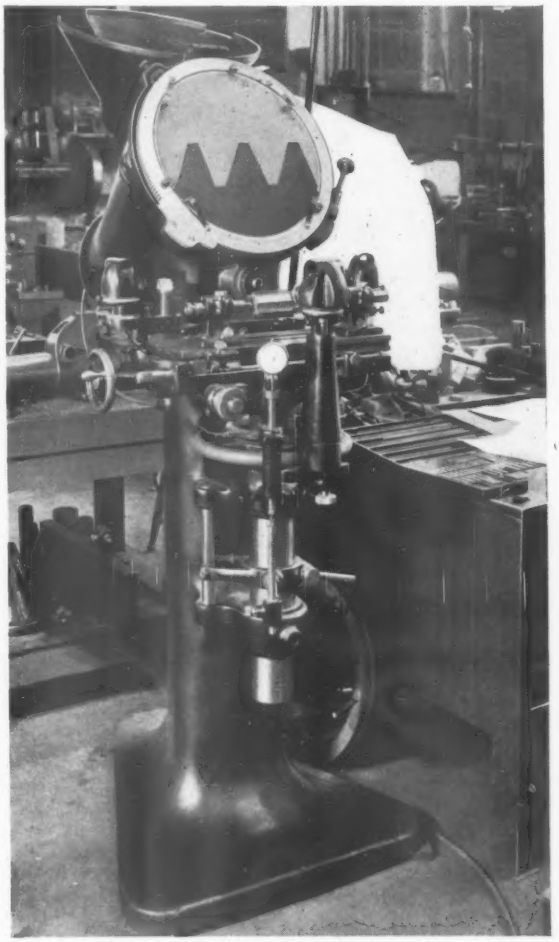


This machine was found on the PRODUCTION LINE. Here they were checking an eccentric piece against a master outline. The Comparator checks each part step by step, so that the finished product will bear an assured O. K.

IN A MODERN SHOP

THESE PEDESTAL COMPARATORS ARE GIVEN THE RUN OF THE SHOP

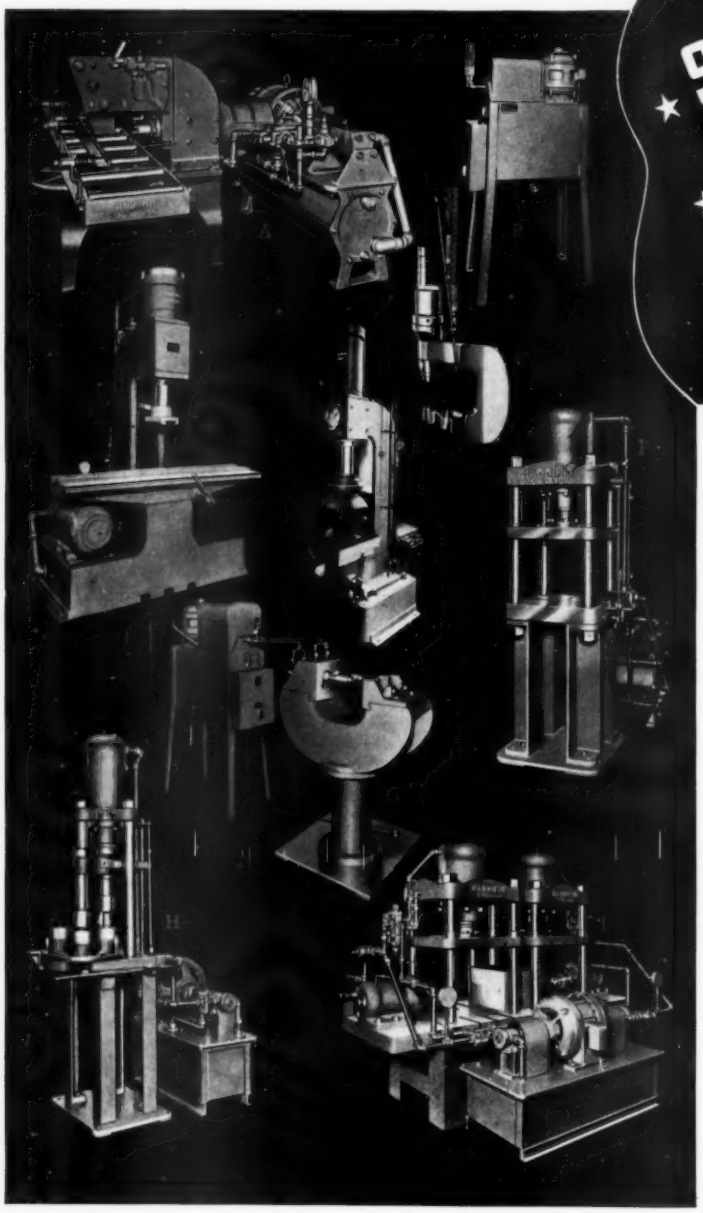
The pictures of the J&L Pedestal Comparators, shown on these pages, were snapped by our cameraman in a customer's modern shop. . . . Each machine was found in a different department. . . . They were found among the grinders, shapers, lathes, etc. . . . Both foremen and operators run the Comparators. (Any shopman, after a few minutes instruction, can operate the machine with speed and precision). . . . . This manufacturer thought them so indispensable that he mounted them on wheels so that they now have the run of the shop. . . . Although the J&L Comparator is a precision instrument, it is a machine that belongs right out in the shop — *your shop.* (Vibration does not affect the image or the accuracy of the measurements). If you have not already discovered its merits, whether for projecting, measuring or comparing objects, write for further information; or, better still, make an appointment to have one of our engineers call on you.



This Comparator is in the INSPECTION DEPARTMENT. On it are tested all sorts of tools and gauges. A tap was being tested as this photo was taken. (Note the attachment for reflecting objects that cannot be projected).

JONES & LAMSON MACHINE COMPANY
SPRINGFIELD, VERMONT, U. S. A.

New ACHIEVEMENTS IN



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THESE Hannifin special hydraulic presses illustrate the diversified range of manufacturing operations where correct application of modern hydraulic power brings remarkable production advantages. Each of these hydraulic units was designed by Hannifin engineers to meet specific manufacturing requirements. Each delivers increased production, simplified handling, and a major cost reduction.

Hannifin engineers are applying hydraulic and pneumatic power and controls to a great variety of production jobs—far beyond the conventional limitations of this type of equipment. Their recommendations on problems of high speed manufacturing or elimination of tedious and costly labor operations are being used by leading manufacturers. Over twenty-six years of specialized experience assure you of authoritative information on the application of hydraulic power to your individual needs. Recommendations will be gladly given upon receipt of your specifications.

A. 50-ton Hydraulic Riveting Machine.
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C. "Hy-Power" Portable Riveter.
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E. 25-ton Hydraulic Testing Machine.
F. 75-ton 4-column Platen Press.
G. "Hy-Power" Special Hydraulic Riveter.
H. 3-column Hydraulic Press with Indexing Table.
I. Duplex Hydraulic Press.

These presses are equipped with built-in hydraulic power units. Many of them can be arranged to operate from central power equally well.

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HANNIFIN
SPECIAL HYDRAULIC EQUIPMENT

ENGINEERS • DESIGNERS • MANUFACTURERS • PNEUMATIC AND HYDRAULIC PRODUCTION TOOL EQUIPMENT

Gage Tolerances

by

R. A. HOLT

PRESIDENT GAGE MANUFACTURERS' ASSOCIATION

Manager R. & M. Manufacturing Company

Member A. S. T. E.

We still hear pet phrases to indicate accuracy such as "On the Ball," "Dead Nuts," "On the Line," and many others just as indefinite. There are also specifications calling for plus or minus nothing.

There seems to be fastened in the minds of many designers the tolerance of one ten-thousandth, and he proceeds to specify this whether the size be one inch or ten inches. The gage maker's tolerance is as important as the manufacturing tolerance and should be considered as seriously.

Allowance must be made for temperature, shape of gage, area of measuring point, and measuring pressures. The fact that although the gage maker and inspector may have identical (identical with reservation) masters and still get different results by using different measuring equipment is evidence enough that we have split the American inch into so many divisions that it is difficult to keep them all in line.

Steel, with which most of us are concerned, and of which our master blocks are made has a coefficient of expansion of over six millionths per inch per degree of Fahrenheit. These masters are guaranteed by the makers to various accuracies from five millionths to eight millionths in any block under one inch and five millionths to eight millionths per inch in blocks over one inch. With this accuracy maintained it would be possible for a difference from absolute in a ten inch block of from fifty millionths to eighty millionths.

Now then, to be sure that the gage to be measured is within two degrees of the master used, a room would be required of even temperature without draughts or air currents. If we again take into consideration the ten inch block, a variation of two degrees between master and gage to be checked will cause a discrepancy of more than one hundred twenty millionths.

The foregoing statements are in justification of the tolerance chart as adopted by the Gage Manufacturers' Association and reprinted herewith.

Plug and Ring Gage Tolerance

Tolerance on plug gages should be governed by the limits of the part to be gaged. The general practice of gage manufacturers where no tolerance has been specified is to use 10% of the difference between Go and Not Go members.

Ring Gage tolerance should be specified to suit the job.

The following is a list of symbols together with tolerances for their respective size ranges.

XX—Precision lapped (plugs or male masters only).

X—Precision lapped plugs or rings.

Y—Lapped plugs or rings.

Z—Ground and polished (grinding marks may be in evidence).

ZZ—Ground only (for rings only).

Gage limits should always be indicated by use of symbol letters.

		(Male Gages Only)				(Ring Gages Only)
Above	To and Incl.	XX	X	Y	Z	ZZ
.029—	.825	.00002	.00004	.00007	.00010	.00020
.825—	1.510	.00003	.00006	.00009	.00012	.00024
1.510—	2.510	.00004	.00008	.00012	.00016	.00032
2.510—	4.510	.00005	.00010	.00015	.00020	.00040
4.510—	6.510	.000065	.00013	.00019	.00025	.00050
6.510—	9.010	.00008	.00016	.00024	.00032	.00064
9.010—12.010		.00010	.00020	.00030	.00040	.00080

Just how to establish a rule becomes a problem for each industrial branch according to their own requirements. One rule adherred to by many is that 10% of the difference between Go and Not Go be the gage tolerance. Now, in which direction shall we put this gage tolerance?

A common practice of many is to designate the tolerance on a Go member on the plus side. The tolerance on the Not Go would be evenly divided plus or minus. Another system is shown in Figure 1. The top row of figures represents thousandths of an inch, and the rest is self-explanatory. It also takes into consideration wear allowance, and takes away the personal opinion of inspectors when rejecting a worn gage, also insures uniform results.

Let us now consider the hypothetical case of a part to be checked, the size specified to be .625—.626. By the 10% rule the size and tolerance would be Go .625 plus one ten thousandth, minus nothing; Not Go .626 plus or minus fifty millionths. The tolerances given are, of course, gage maker's tolerance, and no wear allowance has been made.

By referring to Figure 1, this same gage made to the chart would be .6251 plus one ten thousandth minus nothing; Not Go minus fifty millionths plus nothing. By this system a wear allowance of one ten thousandth is specified for the Go member and no plus tolerance used on the Not Go. This will materially increase the life of the Go member, which at the same time robs the manufacturing tolerance.

The writer has not meant to confuse but rather stress the importance of a rule, and then by use of the symbols for tolerances as worked out by the Gage Manufacturers' Association eliminate the guesswork. The designing engineer must remem-

(Continued on page 34.)

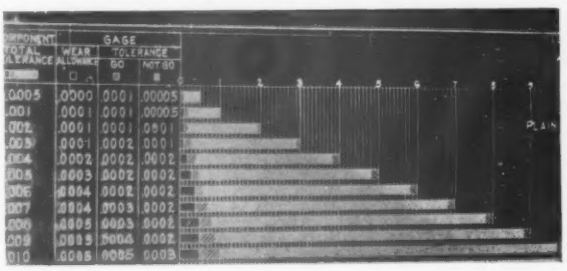

Figure 1

PRODUCTION PERSPECTIVES

NEWS OF MASS MANUFACTURING FROM EVERYWHERE

There is no big change to report in this column regarding mass manufacturing production schedules or operations. Everywhere mass production plants are busy, Tool Engineers busy and the **outlook** for the **last six months** of this year appears to be **even better than the first six months** have been. Quite a few plants, here and there, are working two shifts—some with three shifts. In a few isolated cases, some plants are having the **highest production in their history.** Many plant expansions are under way. There is a **marked shortage** of **skilled machine hands** in several sections of the country.

From Cleveland we hear **National Acme** has sufficient orders to keep it **busy the rest of the year,** while **Cleveland Twist Drill Company** is **spending $500,000** for a **plant addition** and **new equipment.** $400,000 it is said will be spent for the building while the balance is to be spent for new equipment. The **June index** of the **Machine Tool** Builders Association rose to **128.8,** an **increase** of **8.3%** over the previous month **and 41.3% over 1935.** These figures put the machine tool industry at the highest point in ten years with the exception of the latter part of 1928 and 1929.

While plants have been busy, nevertheless picnics and annual outings of employees have been prevalent. **Firestone** Tire and Rubber Company employees and their friends and families, **50,000** strong, descended on Euclid Beach Park in Cleveland, July 17th. Special trains and hundreds of automobiles brought the merrymakers from Akron. The occasion was the 35th Annual Firestone Picnic. **Ex-Cell-O Aircraft and Tool in Detroit** held their annual picnic at Belvidere Park near Detroit with an **attendance of some 3500,** and **Eclipse Counterbore** of Detroit packed one of the larger excursion steamers July 25th to go down river to Bob-Lo Island Park. **Whitman-Barnes** will hold their annual picnic in the near future. The summer picnic of the **Delco-Remy Company** of Anderson, Indiana, the **largest industrial outing** of the **middle west** was held July 18th at Riverside amusement park in Indianapolis.

. . . . . .

Connecticut mass production plants and tool manufacturers continue to show sustained activity in spite of the hot weather, and present indications point to a continuance of high level production right through the Fall months . . . . **Landers, Frary & Clark,** New Britain, has disclosed tentative plans for a six-story addition, which will be used in expanding production of **Universal washing machines,** electric refrigerators and other heavy appliances. Bids have already been received for the construction work, but the start of building operations is indefinite . . . . . **Holo-Krome Screw Corp.,** Bristol, has purchased a 10-acre tract of land on Brook Street, Hartford, and the directors have voted to build a new plant there containing 20,000 square feet of space. The plant will have two floors, the first to be devoted to manufacturing and the second to offices. Separate structures will be erected to house the heat-treating department and the boiler room. The new plant and the move to Hartford will cost about $80,000, it is estimated . . . . **W. Stewart Clark, works manager** of **General Electric Co.,** Bridgeport, has announced that the **Monowatt Electric Co.** will be moved from its rented premises within the G-E plant, making room for a new G-E wire production unit. **Monowatt,** a privately-owned corporation for which G-E does preliminary processing, produces a variety of wire appliances for household use . . . . . **Elwood William Webb,** 42, assistant manager of the **S. O. & C. Co.,** Ansonia, Conn., manufacturers of eyelets and small brass goods, died June 24 of a cerebral hemorrhage. A 32nd degree Mason and long active in fraternal and civic affairs, he joined the Ansonia concern 28 years ago . . . . . **R. Wallace & Sons Mfg. Co.,** Wallingford, silverware, shut down its factory from July 3 to July 20, while repair and construction departments were at work.

Alterations in the Barnum Avenue, Bridgeport, factory taken over by the new **Bridgeport Thermostat Co.** are progressing rapidly in preparation for occupancy by the company, now housed in the plant of the **Bridgeport Brass Co.** . . . . . Philip J. Onkey, 76, president of the **Oriental Rouge Co.,** Bridgeport, manufacturer of industrial rouge, died recently . . . . Organization papers have been filed by the **Cowan Machine Co.,** 64 Water Street, Stonington, listing as officers Joseph F. Joseph, president; John B. Bindloss, vice-president, and Samuel E. Stewart, Jr., secretary-treasurer . . . . **Hartford Special Machinery Co.,** Hartford, is making alterations to its plant at 287 Homestead Avenue, including the construction of a new sawtooth skylight roof . . . . At a recent dinner **New Departure Mfg. Co.,** Bristol, **presented service awards** to 252 employes who have served the company 20 years or longer. Ninety-seven men whose service exceeded 25 years received gold wrist watches and the others were presented with service buttons.

William L. Gilbert Clock Corp., Winsted, successfully reorganized, is now operating with 400 hands and is reported to be in receipt of steadily increasing orders which have reversed the usual summer decline in production volume. . . . **Hendey Machine Co.,** Torrington, manufacturer of machine tools, reports that earnings during the first half of 1936, were almost triple the figure for the entire year of 1935. . . . . **Packard Electric Razor Co.,** has leased 20,000 square feet of floor space in the former Erskine-Danforth Building at Pacific and Manhattan streets, Stamford, and is preparing for immediate occupancy and commencement of operations which will require 200 employees, according to **Dr. Philip Schmitt,** vice-president.

A special machine designed to eliminate silicosis in manufacturing operations is being made by the **Abrasive Machine Tool Co.,** East Providence, R. I., making use of a vacuum, which pulls dust into a

(Continued on page 22.)

FACTORS IN THE PURCHASE OF MACHINE TOOLS

By RAY PERRY

Ingersoll Milling Machine Company

As given before the Milwaukee Chapter Meeting May 14th, 1936

The second monthly meeting of the Milwaukee Chapter of the American Society of Tool Engineers was called to order at eight o'clock, by Chairman George Smart, who spoke as follows:

"The meeting this evening is one that will be of a great deal of interest to all of us and one that is going to add materially to our working knowledge of what it means when a new tool is purchased.

"We have with us this evening a speaker who has been engaged in an end somewhat similar to ours, where we are responsible for the purchase of a machine tool; he has also been on the other side of the fence, where it has been necessary for him to contact fellows of our positions and sell tools.

"I am sure that this question of what the primary factors are behind the purchase of any machine tool will be one of vital interest to us. I know that Mr. Perry will bring us this message and that we will reap a good deal of benefit from his talk, and at this time it gives me pleasure to introduce to you Mr. Ray Perry, of the Ingersoll Milling Machine Company, of Rockford, Illinois."

Mr. Perry: "I think you would like to know something about the machine tool industry. It is a fascinating industry; an interesting business. I am here as an industrial representative of the machine tool industry tonight, and am not trying to sell the Ingersoll Milling Machine Company.

"The machine tool industry is composed of approximately 180 firms—that, of course, is the domestic industries—out of these 180 companies, all except 10 of them belong to the National Machine Tool Builders' Association, which incidentally, met in convention Monday and Tuesday of this week in Chicago.

"About 25 of the 180 companies sell 85% of the total volume of the industry—now, that is interesting. No one of those companies does over a ten million dollar business. All of these figures I am giving you are approximate, but they are quite accurate.

"At the peak volume of the machine tool industry, the industry did about 160 million dollars worth of business in one year—that was in the gorgeous days of 1929. This year we will probably do in the neighborhood of 100 to 110 million—that is a forecast. In 1933 we just barely did 40 million. There we were running 25% of our 1929 capacity. When you think that 25 of those companies do 85% of that business, you can get a little idea of what the other 155 have to do with their share of 40 million. It is pretty bare picking, believe me!

"All the members of this industry have the same problem in that they have to sell their products; it is an industry in which I doubt very much if there is any great uniformity in selling method. By and large the selling procedure takes place along two lines of independent and diverse thinking. The first is selling through agents, the second is selling through direct representation. . . . So much for the mechanics of selling—now for the theory of selling.

"Let's consider for just a minute why people buy machine tools. I want to talk strictly from the abstract viewpoint for a moment.

"We think there are five reasons why a person wants to buy a machine tool, and I doubt very much if you can find any one of your purchases, if you just toss them around in your mind as I mention these five points, but what you can classify in one of these five divisions.

"The first and most powerful is the purchase of a machine tool for a new product. That by far outweighs all other causes of machine tool purchases. When I say a 'new' product, by the way, I also mean in the same breath, a changed product—I don't mean to restrict that too much.

"The second is the purchase of machinery for increased production.

"The third is, I think, lower cost; that is, you are machining castings for fifty cents now ond you think it would be nice if you could do it for twenty-five, and you go out and buy machinery to do it.

"The fourth reason is that we want better work—that is, more accurate work; you are boring a hole to a .005 limit and your boss says, 'that is pretty sloppy, and you better do it to a .0001,' and that is pretty sloppy, too!

"The fifth and almost laughable reason is the replacement of old equipment—believe me, gentlemen, there just is not any replacement of old equipment—they run and run and run! You may laugh, but I can take you fellows on on some of that—you just take a little ride with me, say about fifty miles from here, and I will show you an Ingersoll machine with a rope drive! You may not believe that, but it is true—it has a rope drive.

"It is really interesting to call on fifty people and everybody has the best shop and the closest work—'they can get away with that in the other fellow's shop, but you cannot do it here'!—I have thought just the same thing.

"We made a very careful study of the way in which our customers judged and justified the purchase of a capital structure, capital goods, a machine tool, a conveyor, anything which involved outlay of capital on which investment is supposed to result. We learned a lot and I would like to tell you one or two things which to me are classic examples of loose thinking.

"A fellow called me up from the end of the line of the Canadian Pacific Railroad and ordered a $40,000 machine over the telephone—he has to think when he does that and he has to have some darned good reason for spending $40,000.

"Now, the funny part of it is that they don't have good reasons. I will tell you about a few of them. I got very much intrigued in this problem two years ago and I selected one of the largest corporations

in this country to buy some of the larger tools in this country; they own a great, big battery of Ingersoll machines, have not bought any for quite a while. I went down to New York to their head office, I called on the Comptroller first—I thought, if I can get any place at all I can get some place with the financial man. I had known him before, and I said, 'Mr. So-and-So, tell me how you know that you have made a good investment on a machine tool—what is the financial set-up of this thing?'

"'Oh', he said, 'we do that very systematically, it is very, very well done!'

"I said, 'That is very interesting, that is fine—let's see how you do it,' so he leafed over a lot of impressive-looking volumes, 'Well, we bought a lathe here —'

"What did you pay for it?"

"Well, we paid $3500.00."

"I said, 'How do you know that you got your $3500.00 back?'

'Oh, we know we did.'

"I said, 'Did you buy that for lower cost work?'

'Yes, we did.'

"'How do you know that you got it back?'

'Well, we calculated that very carefully.'

"I said, 'Tell me specifically, how did you calculate it?'

"He looked around, rolled over some more sheets, and finally he said, 'Well, the foreman said that was a good thing and I guess that is the way we did it!'

"I said, 'Well, are you going to get your $3500.00 back?'

'Yes,' he said, 'we are.'

"I said, 'How?'

'Well', he said, 'it will come back in savings.'

"I said, 'You bought that tool two years ago. How do you know that you got your $3500.00 back—how do know you did not throw it out in more power consumption? How do yon know that the machine did what it was supposed to do, generally?'

'Well,' he said, 'I don't know that I do.'

"Now, that fellow this year will probably buy three-quarters of a million dollars' worth of machinery, and it is a damn well run organization!

"We have a very, very interesting classic example we tell a lot of our customers when the subject comes up. Our salesman (he is from Ohio, incidentally—that ought to relieve your minds from any difficulty as you think about it) went into a plant and he said, pointing to a milling machine that was standing next to a planer (the milling machine was standing still), and he said, 'We put this milling machine here to save you money—you can do the work on this particular milling machine in about one-third of the time you can do it on that planer'—(the planer was in operation).

The foreman said, 'We cannot afford to run that miller.'

"'Well,' the salesman said, 'how is that?'

"'Well,' he said, 'I will tell you, the Accounting Department have a machine burden of $1.00 an hour on that planer, and $3.00 an hour on the miller, and I am saving the company money by not running the miller.' Now, if that was not laughable! It is just a tragedy that the economics of the situation have caught up with the mechanics.

"One of the largest corporations in this country that is making Diesel engines, allowed 200% on every hour saved when calculating time saved on new pieces of equipment; other organizations allow nothing, say that you must pay back in direct labor only. I don't want to quarrel with the thing—you understand I have no interest in whether it is calculated one way or the other—I have my own beliefs and it does not make any difference to any of you what those beliefs are, because they may not apply to your business (pointing to one person in the audience) and they may apply to yours (pointing to another), but the point is you must decide if you are going to make an intelligent purchase.

"Dean Kimball of Cornell University made quite a profound study; he finds that out of several thousand industrial plants in this country, the average plant, that is, the average figure used for this policy figure is about three years. The automotive industry is outstanding in that it calculates, generally, six months to a year. There are some plants that allow you as long as ten years.

"If you will just try to analyze your machine tool purchases, you will find that that thing is not as clear as you think, it is in your mind and of course, that is irrespective of whom you buy it from, it is the purchase of a tool. We are not concerned with how you do that, we are not concerned with the items that you put in it, we are not quarreling with you and won't quarrel with you about the calculations that you make, so long as you will be fair with us and say that we have thought about it. We recognize it as a need between two people, whose objectives must have a common focus and that is the basis on which we judge this purchase.

"Now, I am going to lay off this subject a while—I would like to discuss this thing, if anybody would like to talk about it, it is so very vital to us and to other members of the machine tool industry. . . . Has anybody any questions they would like to ask me?"

Chairman Smart: "Possibly the fact that Mr. Perry was formerly connected with the Hudson Motor Car Company may give you an opportunity to ask some questions. We up here in Milwaukee, possibly, are not engaged in quantity production similar to that which one would find in the automotive industry, and the question of purchase of machine tools is not of as vital interest to us as it would be to one connected with the automotive industry."

EDITOR'S NOTE.—At this point a number of very interesting questions were asked by members and guests of the Milwaukee Chapter. Among those who participated in this discussion were Chairman George A. Smart, Tool Supervisor of the Allis-Chalmers Company, Mr. Arthur Johnson, Tool Superintendent of the Cutler-Hammer Co., Mr. Roland Nauertz, also of the Cutler-Hammer Company, Mr. Eldred A. Rutzen of the same company and Mr. O. F. Rendenbach Chief Tool Designer of the A. C. Smith Company. Following this question and answer period stereopticon slides were shown. The dinner was attended by sixty-eight members and guests, while more than one hundred were present for the technical session.

PATENTS

PRIOR ART, VALIDITY AND INFRINGEMENT

By EVERETT G. WRIGHT
Patent Attorney
Detroit, Michigan
Member of the Michigan and Federal Patent Bars

Fifth in a series presenting a concise, informative guide on the subject of patents.

Classification of Prior Art. The prior art comprises any art, machine, manufacture or composition of matter which was,

(a) known or used by others in this country before the invention or discovery thereof by the inventor.—Actual public knowledge or use of a complete operative device or embodiment accessible to the public is required. Secret knowledge or use or experimental use is not sufficient.

(b) patented or described in any printed publication in this or any foreign country before the invention or discovery thereof by the inventor.—A complete operative device disclosed in any patent is a part of the prior art as of the date the patent issues in the United States and most foreign countries. In such foreign countries that publish the patent before the date of issue, the publication date applies. A printed publication comprises anything that is printed and made generally accessible to any part of the public such as books, magazines, trade papers, catalogues, text leaflets, scientific journals, drawings or provisional specifications published by the British Patent Office.

(c) patented or described in any printed publication in this or any foreign country more than two years prior to the inventor's application for patent. See notes for (b) *supra.*

(d) in public use or on sale in this country more than two years prior to the inventor's aplication for patent.—Use by the public or sale to the public of one or more complete operative devices or embodiments is required. Experimental use or sale for experimental purposes is not sufficient.

Validity of Patents. A patent is *prima facie* evidence of its own validity. Where a doubt relative to the validity of a patent exists, the courts will resolve the doubt in favor of the patentee.

Many patents are invalid due to the lack of diligence by the inventor in applying for a patent, or because of a careless or fraudulent application for patent. Other invalid patents are granted through misconception, inadvertence or mistake by the Patent Office.

When properly before a court of competent jurisdiction the validity of the entire patent or one or more of the claims thereof may be challenged on one or more of the following grounds:

(a) That for the purpose of deceiving the public, the description and specification filed by the patentee in the Patent Office was made to contain less than the whole truth relative to his invention or discovery, or more than is necessary to produce the desired effect.

(b) That the patentee had surreptiously or unjustly obtained the patent for that which was in fact invented by another, who was using reasonable diligence in adapting and perfecting the same.

(c) That the invention claimed was not a statutory subject of a patent.

(d) That the patent contains no invention over the prior art.

(e) That the subject matter was not novel at the date of the alleged invention.

(f) That the invention lacked utility.

(g) That the invention had been in public use or on sale in this country for more than two years prior to the application for patent.

(h) That the invention had been abandoned to the public.

(i) That the invention claimed in the patent is substantially different from anything described in the specification or shown in the drawings of the application for said patent.

(j) That the invention had in fact been made by another jointly with the sole applicant, or by only one of the joint applicants.

(k) That the specification did not disclose the invention in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which the invention appertains, or with which it is most nearly connected to make, construct, compound or use the same.

(l) That the claims do not point out and distinctly claim the invention.

(m) That the invention claimed is substantially identical to an invention claimed in a prior patent granted to the same inventor.

(n) That, if the patent in question is a reissue patent, it was improperly granted, or it contains broader claims, or a different invention than the original patent.

(o) That the Commissioner of Patents exceeded his legal authority in granting or reissuing the patent.

Infringement. An infringement is the unauthorized making, using or vending during the term of the patent grant that which falls within the scope of one or more claims of a valid patent issued to another.

In determining whether or not a device infringes a patent, the patentee is entitled to have his claims read on the alleged infringing device not only in view of that which was specifically claimed in his patent, but he is entitled to a full range of equivalents for each and every element of his invention, the said range of equivalents being commensurate with the scope of the claims and the state of the prior art at the date of the invention. Therefore, infringement cannot be avoided by the substitution of equivalents for one or more elements of an invention.

In infringement proceedings each claim of a patent is considered separately from the others, and the defense usually raises the question of validity since only valid patents are enforceable. The courts, therefore, may hold some claims of a patent "valid and infringed," other claims "valid but not infringed," and others "invalid."

The relative rights of the holders of primary and secondary patents, were defined previously (under paragraph "Basic *versus* Improvement Patents.") From the above, it is readily observed that the holder of a primary patent will infringe a secondary patent if he makes, uses or vends his invention together with the improvements claimed in the secondary patent. Also, the holder of a secondary patent will infringe a primary patent if he makes, uses or vends his improvement together with the basic invention claimed in the primary patent prior to the expiration of the term of the primary patent. Infringement of primary and/or secondary patents may be avoided by cross licensing agreements between the holders thereof, or by one party acquiring both the primary and secondary patents, or by one party obtaining a license under the patent of the other.

Searches. In order to determine whether or not an invention is patentable, a "preliminary search" is often made prior to filing an application for patent. A preliminary search comprises the examination of previously issued patents pertaining to the art most closely related to the invention. Though cursory in its nature, the preliminary search reveals a basis for a patent attorney's opinion relative to the novelty of an invention. The opinion, when rendered to a client, usually consists of a detailed report on prior art patents disclosed by the search which relate to the invention; a recommendation relative to the advisability of proceeding with a patent application covering the invention; and a statement as to whether or not broad or narrow patent protection may be expected.

Preliminary searches are made for the sole purpose of guiding the course of an inventor; if, however, a thorough search is desired, it is often less expensive and generally more satisfactory to file and prosecute an application for patent for the invention which will give the inventor the advantage of the Patent Examiner's intimate knowledge of the state of the prior art and, at the same time, provide the inventor with an early date for constructive reduction to practice.

An "infringement search" usually comprises a thorough search of direct and related prior art for patents containing claims which are broad enough to include the device being investigated for possible infringement; and, if a patent containing such claims is found, it may be desirable to investigate its validity since only valid patents may be enforced against infringers. An infringement search should always be made before any material expense is incurred in producing or commercializing a new article or product.

A "validity search" comprises an investigation of the entire field of prior art with particular attention devoted to the question of novelty since anticipation by prior art not known of or cited by the patent office causes many patents or claims or patents to be invalidated.

Infringement and validity searches are all-important to manufacturers developing and marketing new products, to parties entering into licensing or cross-licensing agreements, and to organizations which develop and finance new inventions. Much expensive litigation can be avoided and many licenses under conflicting patents may be negotiated as the result of timely infringement and validity investigations and reports by competent patent attorneys.

A.S.T.E. ANNUAL GOLF TOURNAMENT

Detroit Chapter's annual golf tournament was held at the Rammler Club, July 25th with 63 members and non-members playing. The play started early in the morning and wound up at 5 o'clock with an excellent dinner and the distribution of prizes. The following firms kindly donated the many prizes: Greenlee Brothers Company, Westloff Tool Company, Sterling-French Machinery Company,

(Continued on page 28.)

Should Automobile Manufacturers Make Tools and Machinery?

An Editorial

by

A. E. Rylander

The answer is yes, if on the same presumption a shoemaker should make the tools and machinery of his craft. However, the shoe manufacturer sticks to his last,—uses his factory space for the product of his line. The same is true of the butcher, the baker and candlestick maker, each devoting himself to his own trade and buying equipment from concerns which as rigidly stick to their lines.

Of course, we cannot here draw a blanket conclusion, rather, we must consider that in the beginning each of these doubtless developed the original of the type of equipment used. While a hammer is a hammer anywhere, there are, obviously, many kinds of hammers. The same is true of production equipment and machine tools—and of special tools. We had blanking and forming presses, for instance, before the automobile was conceived, but the invention of the motor vehicle, and its subsequent mass production, necessitated presses of proportions previously undreamed of. We also had machine tools—lathes, millers, drillers, planers, grinders etc.—but automotive production entailed specialized designs which, in time, have practically become standards. To round out the picture, we also had jigs, fixtures, gages and cutting tools; the automobile also modified these, and gave impetus to new designs and developments.

As specialty manufacturers in other lines developed (or caused to be developed) modified types of equipment to suit their special requirements, so the automobile manufacturers developed the tools and machinery suited to their needs. *They had to*, because, conceiving new methods of production, methods often without precedent, they had nothing to draw from. No equipment maker, no machine tool builder or toolmaker had anticipated the demands of the auto industry. Why should they have, any more than equipment makers of a decade ago—or less—could have foreseen the modern streamlined trains? New developments and inventions necessitate new methods of production.

Yet, in the automotive field, conditions are different today. When we want a conveyor suited to a new layout we call in a conveyor specialist, or, citing another analogy, when we develop a new type of body or frame we call in manufacturers of production equipment and lay our problems before them. "Here is what we want to make. Can you furnish the equipment?" That is, to an extent. For there is still the temptation to improvise and to design, not only equipment, but machinery and tools. A larger proportion than is yet prevalent could better be handled by specialists in the respective lines. That, in a nutshell, is the writer's belief.

That belief, however, is tempered by the facts, and the statement itself must be qualified. Many departures from the conventional, in automotive design—in *any* line, for that matter—depends entirely on the proposition;—*can it be made?* If existing equipment is inadequate, then the new development demands new methods of production. In many instances, only the inventor or designer of the new product is qualified to lay out the equipment necessary for production. Or, putting it another way, a radical departure in equipment design fathers a new product.

Then, too, there are other considerations. Competition, for one. A body builder, for example, may develop a method of production which revolutionizes his craft; in that case, he may wish to keep his method secret. That is entirely within the rules of the game; let the other fellow beat him if he can. In any event, the new concept is developed, at least in its initial stages, by the manufacturer of product, then, when satisfied as to its possibilities, the equipment maker may or may not be called in. In most cases, he *should* be.

Another consideration is inventive genius. Everybody is not qualified to design, nor are all designers qualified to handle diversified lines. The versatile designer is exceptional; rare indeed if he combines inventive ability with a broad practical training. Hence, new concepts, be they of product or the equipment to produce it, are often contingent on finding the man who can reconcile theory with practical results. But, even so, it is entirely reasonable that the broach specialist, the machine tool builder, the small tools manufacturer and the tool specialist, concentrating on particular lines, develops a prescience which makes him the logical authority on the final design and building of equipment.

From the foregoing, it can be appreciated that we cannot establish a hard and fast rule. In terms of averages, however, it can be fairly stated that space is valuable, and that the same floor area devoted to machine shop or tool room, in many automotive plants, were better adapted to the manufacture of product. Dividends are paid in ratio to the number of units sold, not in proportion to floor space dedicated to an expense account. In conclusion (if an academic discussion can be concluded) it follows that in larger establishments at least, a certain proportion of development is inevitable, but that in general practise the shoemaker should stick to his last. Make better shoes, and put the maker of equipment in the tough spot of designing and building the tools and machinery of production.

EDITOR'S NOTE.—We have, here, one man's opinion regarding the question: Who shall design and build manufacturing equipment—the maker of product or the builder of machinery and tools. The question is provocative of discussion.

Tool Engineering
and the
AMERICAN SOCIETY OF TOOL ENGINEERS

by
O. B. Jones

The name "Tool Engineering" is so new it is difficult even for those devoting all their time to it, to specify exactly what it should or does include or to indicate its exact boundary lines. Yet many of the elements of Tool Engineering originated in antiquity, for certainly even before the Pharaohs of Egypt tooled the stones to build their world-famous sepulchers, Tool Engineering was old.

The designing and building of tools, and the planning of manufacturing processes had been an incidental function of general engineering for many years. The function received little attention, and required little attention, until interchangeable manufacturing became general.

It is impossible to conceive of interchangeability, that is, the making of thousands of identical details, without the assumption of near perfection in form and durability of tools. Nor is it possible to visualize the parts of a complicated assembly passing through a factory from machine to machine, and from process to process, in their various stages of manufacture from the ingot to the final assembly line, without also assuming the pre-existence of very careful planning.

In the fewest words, Tool Engineering is the devising of manufacturing processes, the orderly arranging of their sequence and the designing of all production equipment.

To vision the breadth and scope of Tool Engineering, one need but recall that each machine, and each device used in conjunction with a machine, or any device used by the hand of a workman in any manufacturing process, is a tool.

The development and spontaneous growth of mass manufacturing has had a profound effect upon nearly every phase of human existence today. The continued advancement of civilization will depend largely upon the advancements made in mass manufacturing. But continued development of mass manufacturing can only follow the development of tools.

Because of the growth of mass manufacturing and the consequent importance and immensity of the problems of tooling, they were inevitably divorced from general engineering and the new profession of Tool Engineering was born.

Master mechanics, tool, die and machine designers, plant superintendents, and other engineers and executives with varied titles had been doing Tool Engineering nearly as long as it was possible without the benefits of an association which could coordinate their activities, assemble the information they needed and aid in the solution of their peculiar problems as the older societies have met the needs of their members.

Historians can usually throw a halo of romance around the events or natural actions of an individual or individuals instrumental in pioneering a movement or founding an empire. But it seems to those who founded the American Society of Tool Engineers that heroics had no part in its humble beginning. The time was at hand and the conditions were ideal, so no heroic efforts or sacrifices were necessary.

Indeed the simple circumstance, or prosaic situation, that really started the American Society of Tool Engineers was the "Hungering and thirsting after knowledge" of a group of students of the little Detroit College of Applied Science. They had been conducting a Tool Engineering Society for several years. Aside from considerations of good fellowship, its principal purpose was having experienced Tool Engineers bring practical information for presentation at their meetings.

This did not provide as close contact with Tool Engineers as the students needed. O. B. Jones, President of the College, therefore, conceived the idea of reorganizing the student society into a national society for Tool Engineers.

He first discussed the idea with Ford R. Lamb, now President of The Society, who consented to attend a meeting provided one could be arranged with other Tool Engineers.

A week or so after this, around the middle of February 1932, a small group was invited to meet at the College to discuss the idea. Those present were Frank E. Shailor, who was then a die design instructor at the College; Frank H. Hartlep, then chief tool designer for the Timken-Detroit Axle Company; Guy E. Swartz, of the Swartz Tool Products Company; Otto F. Poelke, then of the Cadillac Motor Car Company; Ford R. Lamb and O. B. Jones.

Organization plans were worked out at subsequent meetings which were attended by additional Tool Engineers. On March 3rd, thirty-three Tool Engineers representing a cross-section of local manufacturing, elected five of their number as officers to serve for a period of one year.

J. A. Siegel of the Packard Motor Car Company was elected president. W .H. Smila of the Chrysler Corporation was elected first vice-president, and Earl Ruggles of the Gemmer Manufacturing Company was elected second vice-president. The first secretary was A. M. Sargent of the Pioneer Engineering and Manufacturing Company. Wm. J. Fors of the Stenger Die and Tool Company was elected treasurer.

About three weeks after the election of officers a first general meeting was held at Webster Hall Hotel in Detroit on the evening of March 23rd, for their installation. At this time the membership consisted of approximately 200 senior and junior members. The Society was chartered under the laws of the State of Michigan as a non-profit corporation March 31, 1932.

Official Publication

One of the most impelling reasons for organizing the Society was to keep Tool Engineers advised of

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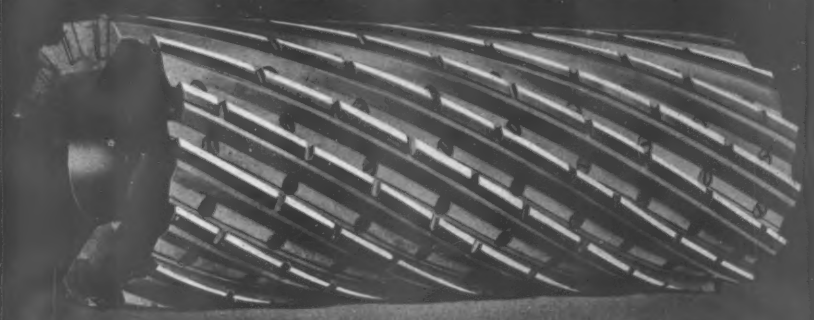

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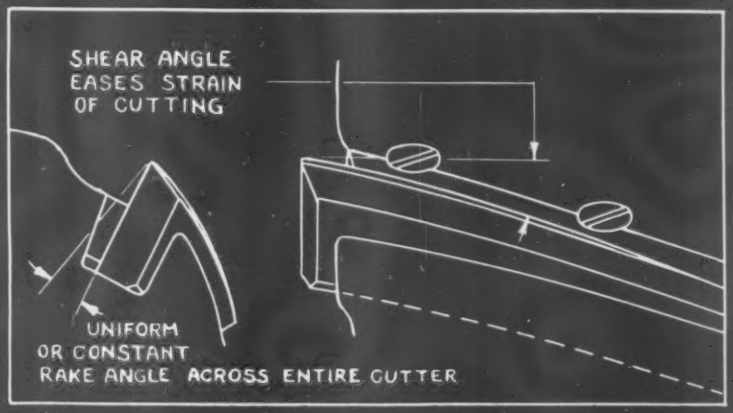

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Write for New Ingersoll Cutter Catalog describing these and other Inserted Blade Cutters.

The Ingersoll Milling Machine Co., Rockford, Illinois

An efficient yet renewable inserted blade slab milling cutter. The only inserted blade slab cutter permitting use of single wide sections. Also made to interlock for extreme widths.

● Ingersoll Helical Milling Cutter Blades are forged, twisted, hardened, then ground to *true helix* to fit accurately the helical slots milled in body. Blades securely retained by helical wedges and screws. Cutter body of forged and heat treated alloy steel.

● Ingersoll Helical Milling Cutter Blades present constant rake angle to work with steep helical or shearing angle enabling cutter to mill with minimum of power. Several teeth always in cut. This and shearing action of Ingersoll helical blades give smooth finish at high feeds.

● Use Ingersoll Solid Shank Helical End Mills for reaching into inside pads or bosses for efficiently cutting wide surfaces while end milling. The only inserted blade end mill for end milling surfaces of extreme width.

what was taking place throughout the entire Tool Engineering field. That the young Society set about the accomplishment of this task with real speed is evidenced by the fact that five hundred copies of a twenty-four-page journal of the Society were mailed to the membership and potential members latter part of April,—within thirty days of the date of its incorporation. It bore the May 1932 date.

It was compiled, edited, and managed completely by a committee known as the "Publicity Committee." The "A.S.T.E. Journal" was published under F. R. Lamb's leadership until the May 1933 issue when the chairmanship of the Publicity Committee was turned over to O. B. Jones who was responsible for the publication of this Journal until the February 1935 issue.

From that date to this the official publication of the Society has been published under the business management of The Bramson Publishing Company and is editorially supervised by committees appointed by the Society President. At the time the publication was turned over to The Bramson Publishing Company its name was changed from "A.S.T.E. Journal" to "The Tool Engineer." The January 1936 issue of The Tool Engineer had a circulation of more than 5000 copies.

Chapters

As master mechanics, tool supervisors, operations planners, time study men, tool, die and machine designers, and other manufacturing executives who appreciated the importance of tooling, learned that those of kindred occupations had organized a society in Detroit, they became members-at-large. As this membership grew in certain localities requests were sent in to Detroit for charters to operate chapters. Much of the preliminary detail work, as well as the actual field work incident to Chapter Organiation was done by Roy T. Bramson, who is at present in charge of this phase of The Society's growth, as Chairman of the New Chapters Committee. Details of chapter organization were worked out so that where twenty-five members were so grouped as to make their meetings possible charters were granted. The first chapter outside of Detroit was chartered October 21, 1935 at Racine, Wisconsin. A chapter at Cleveland was chartered December 3, 1935, and one at Milwaukee April 2, 1936.

At the present time negotiations are under way for the chartering of nine additional chapters.

The first student chapter was chartered at the Detroit College of Applied Science, May 5, 1936.

Standardization

One of the principal functions of the Society is the assembling of information pertaining to Tool Engineering and passing it on to its members for permanent record. The committee which performs this function is the "Standardization Committee." This Committee was organized in September 1932 with E. C. Lee, chief tool designer of the Jefferson Avenue plant of the Chrysler Corporation, as Chairman. He was succeeded at the end of his year's term by F. H. Hartlep who in turn was succeeded by W. H. Smila who is the present incumbent.

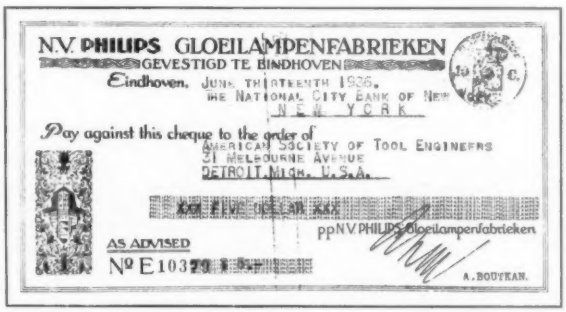
The function of the Standardization Committee at the present time is *not* one of standardizing but the *assembling* of all information pertaining to processes, methods, machinery, machine attachments, perishable tools, and dies and so on, and making it available for instant use of each individual member. This committee has recently perfected a method of collecting, presenting, and preserving this information and has distributed fifteen issues to the member ship to date. It is intended that one or more issues will be mailed to members each month until the entire field is covered.

Control and Membership

The control of the Society is vested in a national non-salaried board of directors consisting of thirty-three members elected by direct vote of the general membership. The national officers are elected annually by the board of directors and also render their services gratis. The only salaried employee is an assistant national secretary. It is partly due to this condition of voluntary service that membership dues are so low that practically anyone can become a member of this Society who is engaged in tooling the mass manufacturing plants which provide for the necessities and luxuries essential to modern living.

From the Land of Tulips

A good idea, taking root, just grows and spreads. In a previous issue we published a letter from Bofors, Sweden, with the compliments of our Swedish admirer. Now, we show you a little billet doux from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A. BOUYKAN.

Imagine the pleasant surprise at the A.S.T.E. National Office when the above check from Holland came in the mail.

Holland—a *check* for initiation fees into American Society of Tool Engineers from Mynherr A. Boutran. First we are a little local, then grow to national proportions—and next? Well, it looks as if the A.S.T.E. bids fair to span the oceans and become an international order. Well, why not?

We greet you, fellow Tool Engineer from the Land of Tulips, and hope that you may be the nucleus of a progressive Branch in your corner of the world. We, in turn, will serve you to the best of our ability, and (don't forget this) eargerly look forward to a little article on *tool engineering* as practised in your land.

Station Type Machines "HOLEUNIT" Construction

● NATCO HOLEUNITS are flexible and interchangeable . . . are completely self-contained and no connections other than electrical are required. They represent the result of years of experience in building high production multiple head multiple spindle drilling, boring and tapping equipment . . . and they make possible the building of highly specialized machines for high production . . . yet they are standard in every respect.

● Equipped with a semi-automatic hydraulic feed, these NATCO HOLEUNITS will operate at any angle. They may be arranged in groups to perform all the required operations on a casting with a single handling. Should the part for which the units are arranged be altered or discontinued, it is only necessary to rearrange the units, equip them with new spindle boxes and the machine may be used for an entirely different piece of work.

● Illustrated at the right is a NATCO Station Type machine . . . distinctly a single purpose machine built to perform a total of 64 drilling, boring, chamfering, rough and finish reaming and milling operations on a cast iron cylinder block . . . yet the machine is built of standard NATCO HOLEUNITS . . . and may be altered as required with a minimum of expense.

● NATCO HOLEUNITS are built in a variety of sizes and capacities. Call, wire or write for a NATCO representative. Investigate these NATCO HOLEUNITS today.

Here is the NATCO *method*

of Building High Production Drilling, Boring and Tapping Machines with FLEXIBILITY

● It's our business to lower your costs and increase your profits. Get a step ahead of competition and lower your costs now. NATCO Engineers will be glad to study your drilling, boring and tapping problems. Without any sort of obligation on your part we will make a careful survey and lay our recommendations before you . . . then you be the judge as to whether they can save you money. Send in your prints or call a NATCO representative today.

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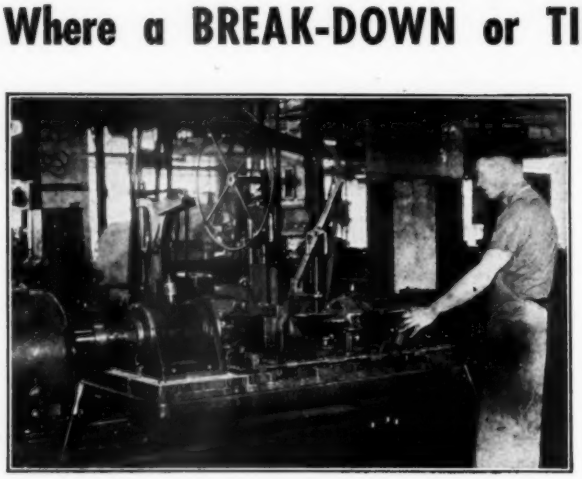
NATCO
SOLVES YOUR HOLE PROBLEM

NATCO Drilling, Boring, and Tapping Equipment

IN THE THICKEST OF THINGS a

Where a BREAK-DOWN or TIE-UP would invariably SEND THE OPERA

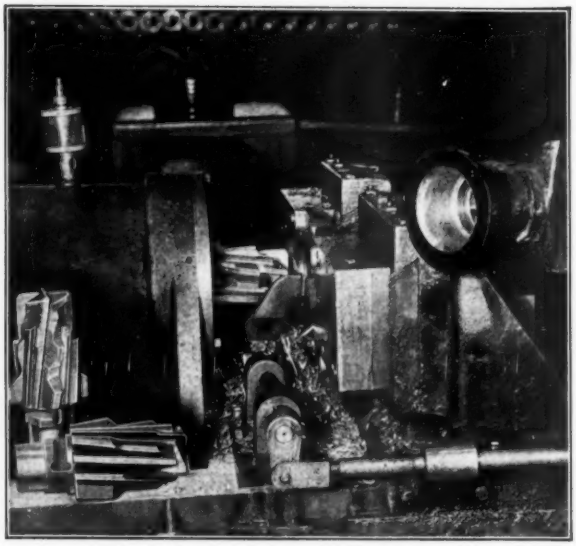
CUTTING TOOLS W



There —

ECLIPSE Multi-diameter cutters rough machining five surfaces at one pass in double end machines.

Seven machines with two cutters in each, bore up to 420 automobile rear axle housings per hour.



Year in and year out (since 1914) Eclipse has been creating and manufacturing special high production end cutting tools for America's leading manufacturers!

ECLIPSE multi-diameter boring cutters o sixteen drill presses rough and finish all i piece differential gear mounts. Capacity Operations consist of flat and spheri chamfering. Cutters are interchangeal

Operations similar to those outlined here may be found in your own plant and we ask you to take advantage of our engineering service. Acquaint us with your problems and we will gladly work with you — no obligation.

ECLIPSE COUNTER

DETRO

S and IN THE "HOTTEST SPOTS"

PERATORS HOME and COST THE PLANT THOUSANDS OF DOLLARS

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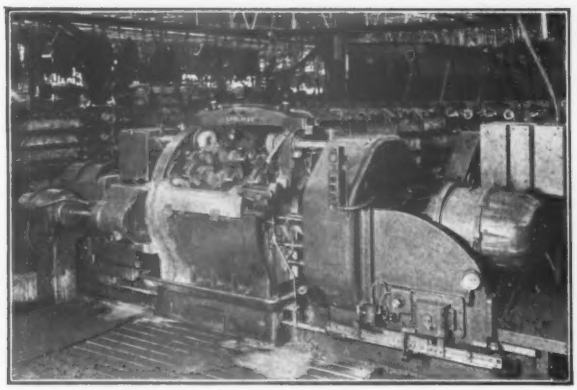

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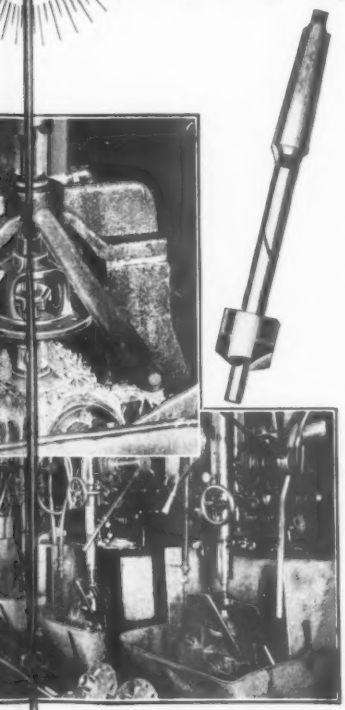
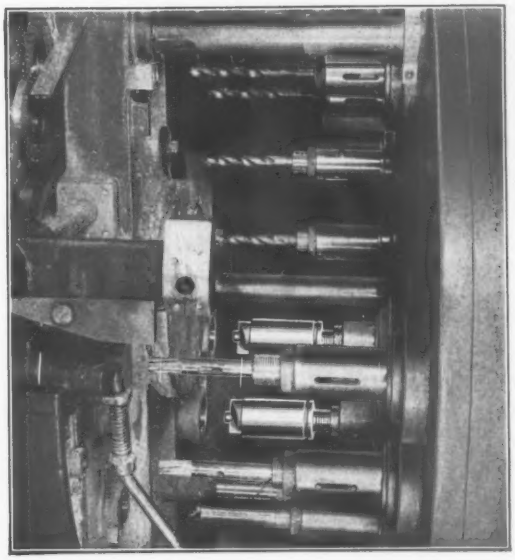


cutters and spherical facing cutters in nish all internal bearing surfaces in one Capacity seventy per hour per machine. l spherical facing, counterboring and changeable and instantly detachable.



ECLIPSE special bushing guided counterbores for recessing ends of forged steel crankshafts in Greenlee automatic double end machine. Close-up shows cluster of drills, reamers and counterbores in one head. Capacity one hundred per hour per machine.

Eclipse experienced engineers and our extensive manufacturing facilities insure you against costly production delays, scrapped parts and grief!

ERBORE COMPANY

TROIT

Many interesting and instructive production operations are illustrated and described in our catalog No. 35, which will be sent you upon request on your firm's letterhead.

Factory representatives in all industrial centers.

PRODUCTION PERSPECTIVES

(Continued from page 10.)

container and by gravity drops it into a dust collector.

The Circular Tool Co., Inc., Providence, R. I., has purchased the plant on Allens Ave., which it has occupied on option for the past year, and has added a modern heat-treating department. The firm manufactures metal cutting tools, and is headed by **W. B. Hopkins** as president and treasurer. **Fred T. Roberts, Inc., Pawtucket,** R. I., has been incorporated to manufacture machinery and commodities. Incorporators are **Harold B. Tanner, George C. Davis and Pattie B. Dwelle, all of Providence.**

. . . . . .

From the **Springfield,** Massachusetts **area,** we hear that **"No Help Wanted" signs have been removed** from employment managers' doors and that the automobiles of an ever increasing number of workers are parked over the streets and in vacant lots near factories, as both employment and production figures continue to increase.

Officials of leading factories estimated **business gains** so far this year of anywhere **from 10 to 30 per cent.** There is hardly a factory in the entire section that has not experienced some gain over a year ago.

United American Bosch Corp. at present is launching its largest radio receiving set production program which is providing work for many additional people with prospects that still more will be taken on as the production progresses. **Arthur T. Murray, Bosch president,** was quoted as predicting a 100 per cent increase in radio sales for the coming season.

The Package Machinery Co. is considerably ahead of last year at this time, according to Roe S. Clark, treasurer. Incidentally it has been one of the dozen or so factories in Springfield, Mass., which has been hampered in increasing production by the lack of skilled machinists in which there has developed a very definite shortage within the last six months.

The Perkins Machine and Gear Co. of West Springfield is doing very well in the words of **Dr. E. C. Gilbert,** general manager, who added, "It also looks like it will continue."

An increase of 25 per cent over last year is reported by the **Blair Manufacturing Co.** which expects its 1936 volume to include the largest number of units in its history.

The Indian Motorcycle Co. is **55 per cent ahead of two years ago** and 25 per cent better than last year in production, **James A. Wright,** sales director said. It is selling an increasing number of bicycles in addition to motorcycles. The company went into bicycle manufacture about the first of the year and the reception its product has received is most encouraging, Mr. Wright said.

With well over 5,200 employed, the **Westinghouse Electric and Manufacturing Co.,** Springfield's largest industry, at present has more on its payroll at its East Springfield plant than ever before. **Sales of electric refrigerators are at a peak** and the company also has high hopes for air conditioning equipment which is being manufactured here also.

Construction of a **$60 000 addition** to the **Westinghouse** plant already has been started to provide more room. It is expected to be ready by fall and will permit even greater employment there.

(Continued on page 35.)

HANDY ANDY'S WORKSHOP

I went through a large plant the other day—one that I had been going through on and off over a period of time, by the way—and was struck by a marked difference. Previously, I had been conscious of messiness,—the equipment greasy, the stock poorly disposed. But now!—say, the equipment just shone from wiping and rubbing, and material in process was admirably disposed for handling. The atmosphere was one of orderly confusion. Get that now, *orderly* confusion, as one would expect to find in a busy and efficiently supervised shop. I found, on inquiry, that a new superintendent had been appointed.

. . . . .

I met this man, and somehow it seemed utterly natural that he should have effected the changes. For, he only needed a mustache and goatee to be the twin of the superintendent under whom I served my apprenticeship—oh, 'umpty' years ago. A martinet, the 'Old Man' was, when it came to discipline, but, *what* a pal he was to the boys serving their time. You just had to know how to take him.

Each night, before quitting, all machinery and equipment had to be brushed off and wiped. The first job in the morning was to oil up. Then, on Saturday at 4.45 (we worked 59 hours at 6, 8 and 9c an hour for the three years) we *cleaned up.* And how! Just before the whistle the O.M. would go on an inspection tour, a white handkerchief in hand. This, he would wipe across the polished surface of a machine. If it came away soiled—well, there was a stinging rebuke; also, a furtive hustling among the gang to wipe off a suspicious spot on a machine to all practical purposes immaculate.

. . . . .

Looking back, I realize that it was all a grandstand play, to impress the boys with the *importance of thoroughness.* Well, it worked pretty well, at that. For, the old fellow turned out mechanics whose main forte consisted of sticking to a job until it clicked.

We were taught manufacture, setup and tooling, layout and assembly, then, in the last year, we took turns at road work. That, of course, was the big adventure. We were also taught design and math, and were encouraged to design and build model machines. Personally, I built a steam engine, and later, a small gas engine . . . . used to run a boat. Yes sir, those were the days.

. . . . .

From one thing to another—this writing is a tough job. A writer is a good deal like the fellow in the fable, who went to town leading a jackass. "Why don't you ride him, you nut." one critic advised. "The poor beast, carrying such a burden." another bewailed. "Pick him up, and carry him." No sir, you can't please everybody nohow.

Take the material in this Journal, for example. One wants this, and one wants that, but nobody does a darned thing about it except to tell us what to do. They must think the editorial staff is a broncho. "Ride 'im, cowboy!" Take this "John Doe," for instance, with a bill of complaints. Now, I'm sure I'd like J.D. if I met him in the flesh (Come up and see me sometime, John.) but as an anonymous writer he's just a pain in the neck. Now listen, Jack, when *I* write something I sign my name, so

(Continued on page 34.)

REED-PRENTICE

Announces

the appointment of

Sterling-French Machinery Co.

423 New Center Building

as exclusive Detroit Agents

for its complete line of machine tools

including

TOOL ROOM EQUIPMENT, also

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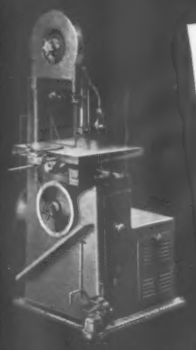
INJECTION PLASTIC MOULDING MACHINES,

BAND SAW and FILING MACHINES.

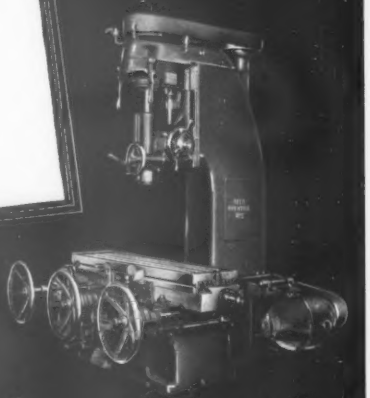
REED-PRENTICE CORP. MACHINE TOOLS WORCESTER MASS. U.S.A.



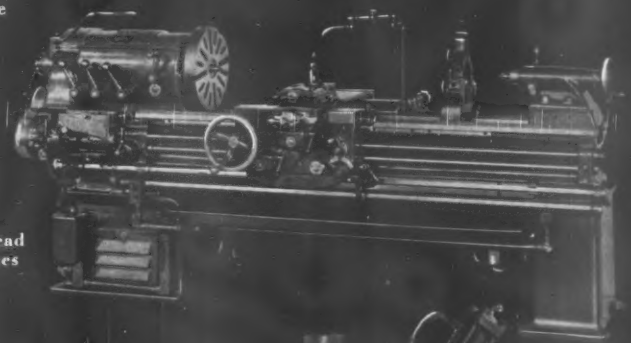
New Precision Band Saw with Filing Attachment

3 V Vertical Milling and Die-Sinking Machine

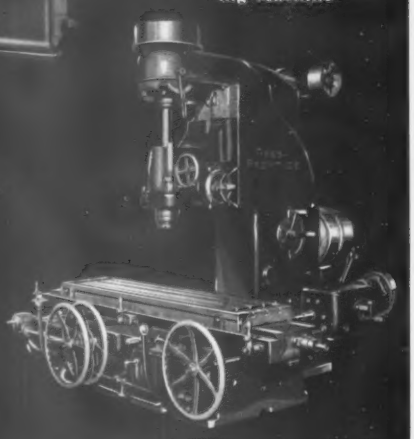
2 V Router and Vertical Milling Machine



Model No. 5 Vertical Milling and Jig Boring Machine



Sliding Gear Head Toolroom Lathes



Model No. 6 Vertical Milling and Die-Sinking Machine

Hydraulic Die-Casting Machine

HARD-FACING MATERIALS DATA

MATERIAL and COMPOSITION	PHYSICAL PROPERTIES	PURPOSES FOR WHICH USED	TECHNIQUE POINTERS FOR APPLICATION	METALS THAT CAN BE SURFACED	ESTIMATED NORMAL LIFE COMPARED TO BEST STEEL
HAYNES STELLITE No. 1 cobalt chromium tungsten	-red hardness -high abrasion-resistance -low coefficient of friction -good corrosion-resistance ——— -weldability—good -tensile strength 40,000 lb. per sq. in. -hardness—Rockwell C-54 -coefficient of expansion — similar to steel -Hardest of the three grades and more resistant to abrasion.	-For coating surfaces subjected to severe abrasive wear and only little shock or impact.	***For Steel*** -Remove all rust or scale from surface to be coated. -Preheat part to be coated if necessary. -Adjust flame so that there is an excess of acetylene. The excess acetylene "feather" should be twice as long as the inner cone. -Bring small surface of base metal to a "sweating" condition, insert end of Haynes Stellite rod into flame and let rod melt and spread over "sweating" area. -Continue putting on the coating until entire surface to be faced is built-up to required depth. Do not puddle. ***For Cast Iron*** -Similar to technique for steel except use slightly less excess of acetylene. Haynes Stellite does not flow as easily on cast iron as on steel. It is necessary to break up the surface "crust" with end of rod. Ferro flux can be used to facilitate this operation and is recommended if base metal is dirty.	***Carbon Steels*** up to 0.60 carbon ***High Carbon Steels*** above 0.60 carbon if properly heat-treated before and after ***Low Alloy Steels*** heat-treatment may be necessary ***High Speed Steel*** not recommended ***Manganese Steel*** special technique necessary ***Stainless Steels*** heat treatment is necessary ***Cast Iron*** easily hard-faced ***Chilled Iron*** on small parts only ***Alloy Cast Iron*** same technique as for gray cast iron ***Monel Metal*** easily hard-faced ***Brass and Bronze*** not recommended ***Copper*** not easy to do ***Aluminum*** cannot be hard-faced ***Hascrome*** easily faced ***Nitrided Steel*** grind off case before hard facing	3 to 10 times longer
HAYNES STELLITE No. 6 cobalt chromium tungsten	-red hardness -high abrasion-resistance -low coefficient of friction -good corrosion-resistance ——— -weldability—good -tensile strength 86,000 lb. per sq. in. -hardness—Rockwell C-43 -coefficient of expansion — similar to steel -Not as hard as, but tougher and stronger than No. 1 or No. 12. Resistance to abrasive wear slightly less than No. 12. Does not check easily.	-For coating surfaces subjected to abrasive wear accompanied by considerable impact. Also recommended for cutting edges of hot work dies. Also for valves of all kinds.			3 to 10 times longer
HAYNES STELLITE No. 12 cobalt chromium tungsten	-red hardness -high abrasion-resistance -low coefficient of friction -good corrosion-resistance ——— -weldability—good -tensile strength 70,000 lb. per sq. in. -hardness—Rockwell C-48 -coefficient of expansion — similar to steel -Not quite as hard as No. 1 and slightly less resistant to abrasion. It is, however, stronger and more ductile. Will withstand more shock and impact than No. 1.	-For coating surfaces subjected to severe wear with enough impact to require more toughness than is possessed by No. 1.			3 to 10 times longer
HASCROME chromium manganese iron	-self-hardening -work-hardening -good abrasion-resistance ——— -weldability—good -tensile strength 40,000 lb. per sq. in. -hardness—Brinell 240 to 500 as deposited depending on application technique. -Tougher than Haynes Stellite but not as resistant to abrasion.	-For surfaces subjected to abrasive wear and severe impact. -Makes a very good base for subsequent coating of Haynes Stellite where it resists the mushrooming effect of impact.	-A flame adjustment half way between neutral and that for Haynes Stelliting is best. -Base metal should be at a "sweating" heat. -Do not puddle. -Use Ferro flux if base metal is dirty.	***Manganese Steel*** special technique necessary ***Carbon Steels*** easily applied ***Low Alloy Steels*** heat-treatment may be necessary both before and after application ***Alloy Castings*** observe heat-treatment precautions ***Gray Cast Iron*** easily applied	Same to twice as long
HAYSTELLITE INSERTS cast tungsten carbide ("Tough" Grade)	-hardness approaching that of a diamond. Moh's scale 9 to 10 -Tough enough to resist chipping or crumbling.	-Where utmost resistance to abrasion is necessary such as for hard-setting oil well drilling tools.	-Melt a small area of base metal and place individual insert in puddle. Surround with thin layer of Oxweld No. 1 High Test Steel.	Same as Haynes Stellite	20 to 50 times longer
HAYSTELLITE COMPOSITE ROD crushed Haystellite ("Tough" Grade) in Oxweld No. 1 High Test Steel binder.	-various screen sizes of sharp, irregularly shaped grains uniformly distributed in a binder of Oxweld No. 1 High Test Steel -easily applied in welding flame.	-Where utmost resistance to abrasion is necessary such as for coating oil well drilling tools.	-Application is made in manner similar to other hard-facing applications avoiding deep puddling and penetration but obtaining enough penetration to make strongest bond between base metal and binding material.	Same as Haynes Stellite	10 to 25 times longer
TUBE HAYSTELLITE crushed Haystellite ("Hard" Grade) in Oxweld No. 1 High Test Steel tubes.	-various screen sizes of sharp irregularly shaped grains contained in tubes of Oxweld No. 1 High Test Steel -easily applied by welding flame.	-Same as Haystellite Composite Rod.	-Same as Haystellite Composite Rod.	Same as Haynes Stellite	10 to 25 times longer

TEAR OUT AND FILE FOR FUTURE REFERENCE

TEAR OUT AND FILE FOR FUTURE REFERENCE

Barber-Colman

Tools unexcelled for accuracy, quality, economy & prompt delivery

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HOBS

CUTTERS

BARBER B-C COLMAN PRODUCTS

MILLING CUTTERS, HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, SPECIAL TOOLS

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BARBER-COLMAN COMPANY

General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

Represented in the Detroit Territory by HODGES MACHINERY CO. 544 New Center Bldg.

This Month's Cover

NERVE CENTER OF DODGE SYNCHRONIZED PRODUCTION

At the Dodge factory, the little machine shown in the photograph on this month's cover is the nerve center of the synchronization system without which mass production and low car prices due to it would not be possible.

Originating at this telewriter, coded details of every car order are transmitted simultaneously to various departments making up the manufacturing chain. Each car order passed over the system bears a number which in due time is placed on motors, frames, bodies, radiators, axles, lamps, interior trim, accessory groups and so forth.

The result of this synchronization is seen in the uncanny accuracy with which blue coach body number 879, lowered from above, is met by blue fenders number 879 arriving on side conveyors, by blue finished lamps numbered 879, and by whatever special equipment the customer may have specified for his particular car. The variety of the changes, so great that even the engine is subject to fifty odd combinations, is further diversified by the number of models included in the day's output.

Thanks to the central telewriter and its connected receiving instruments, the huge network of conveyors is charged and delivers its multifarious cargoes to the worker's elbow with clocklike timeliness, set into motion by the mechanism of the little black box presided over by old-timer Fred Nies.

PYPER NAMED BUICK MASTER MECHANIC —MITCHELL, ASSISTANT

Announcement has been made by the Buick Motor Car Company of Flint, Michigan of the appointment of Fred C. Pyper and Roger E. Mitchell as Master Mechanic and Assistant Master Mechanic, respectively.

Mr. Pyper until this apponitment served the Buick Company in the capacity of Assistant Master Mechanic under Mr. Arthur T. Brabyn, former Master Mechanic, who died sometime ago. Mr. Mitchell most recently has been general tool supervisor.

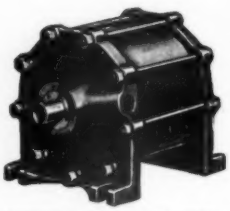
Both men came to the Buick Company some twenty years ago and have advanced through successive steps from tool grinding foreman and tool designer to their present executive positions. *The Tool Engineer* salutes you, Mr. Pyper and Mr. Mitchell, as Tool Engineers who have made good.

TO BETTER SERVE YOU

The Tool Engineer establishes offices in New York and Chicago to serve the needs of readers and advertisers of this publication.

The New York City office is located at 551 Fifth Avenue, with Mr. Charles W. Barton in charge, while the new Chicago office is located at 100 North LaSalle Street, with Mr. Dwight H. Early in charge.

Mr. Herman T. Pierik continues in charge of the New England office at Providence, R. I.

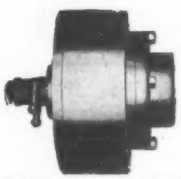


MODEL "B" AIR CYL.

"LOGAN"

AIR OR HYDRAULIC

CYLINDERS

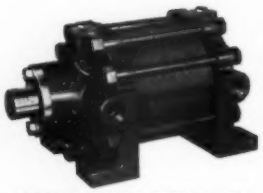


MODEL "R" AIR CYL.

WILL SOLVE YOUR PRODUCTION PROBLEMS

ROTATING OR NON-ROTATING TYPES.

MANUFACTURED IN SEVEN MODELS, FOR AIR, OIL OR WATER SERVICE.



MODEL "HB" HYD. CYL.

SEND FOR YOUR COPY
AIR CATALOG-S-25 HYD. CATALOG AH-31

MODEL "HR" HYD. CYL.

LOGANSPORT MACHINE, INC.

LOGANSPORT - - - - INDIANA

The New SEVEN JEWEL FEDERAL INDICATOR

for greater PRECISION

Just as the finest, most dependable watches have many jewels so do the New FEDERAL LOW-FRICTION indicators have full jewel bearings.

This new development in FEDERAL Indicators, together with other new details of construction, has resulted in an instrument which has greater accuracy than ever before. While it is more sensitive in giving you the real facts about measurements, it is nevertheless more rugged than ever.

Users already have found this LOW-FRICTION Indicator has saved them money on their problems of production and assembly.

For further information write

FEDERAL PRODUCTS CORP.

1144 EDDY STREET PROVIDENCE, R. I.

DETROIT • CHICAGO • MUNCIE • CLEVELAND • NEW YORK

Detroit Chapter's Annual Outing Held June 21st

The Detroit A.S.T.E. Outing came off on schedule Sunday, June 21st, at Maple Grove Park, Utica. The crowd might have been larger, but it was a fine day nevertheless, and those who came had a good time. The banner event of the day, of course, was the ball game between the Seniors and Juniors, the latter winning by 11 to 5. It was a regular game, with broadcast and all. Stark-Hickey, Detroit Ford dealer, provided a car equipped with loud speaker and microphone which also brought in the New York-Detroit game to the field. Dave Forsman was announcer—and say, is he good?

There was plenty of pep in the game, with the Seniors showing streaks of their old form every now and then. The Juniors—well, youth will be served. The lineup follows:

Seniors		Juniors	
H. Royal	ss	2nd	J. Lamb
Stearn	2nd	ss	D. Nizyborski
Seder	p	3rd	Geo. Brown
Winters	sss	1st	Joe Barnett
J. Siegel	lf	c	M. Weinburg
D. Lamb—Perry	r.f.	sss	H. Rogers
Hadock	1st	lf	DeHait
Rylander		p	L. Wokas
Solon	cf	cf	Metzer
Murphy	3rd	r.f.	Walters
Poncelon	c		
Sargent	Bench		

The sports events of the afternoon were under the direction of Mr. Poncelon, of the Gairing Tool Co., and went off in great style. The race for boys up to 10 went to Jack Fenton, second to Thomas Siegel. The girls race was won by Merle Dean, with Carol Siegel second. In the peanut scramble for boys and girls up to 10, first place went to Marilyn Diamond with second place to Ross Lamb. Leota Bernhardt won the balloon kicking contest for women.

The big event was the slipper kicking contest for women, won by Miss Dorothy Rylander. (By the way, she says it came in real handy during the hot spell. The prize, that is. It was an electric fan.) Perhaps the most *thrilling* event was the fresh fruit throwing contest, won by the team of Ford Lamb-Andy Rylander, with McClellan-Siegel second. The *fruit* was fresh eggs—they *were* fresh, weren't they, Otto? You see, Mr. Winters was a mite slow on the recoil, and—and ooooooooooh, what a splash it made! Well, that's the *yolk* of it.

The evening was rounded out with dancing in the pavillion, and a good time was had by all.

A.S.T.E. ANNUAL COLF TOURNAMENT

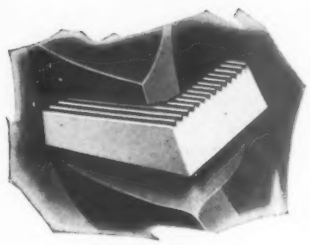
(Continued from page 14.)

The Foote-Burt Company, Whitman and Barnes Company, Gairing Tool Company, Cincinnati Milling Machine Company, Motch and Merriweather, and the Rammler Country Club.

Distribution of prizes was divided into three groups, the low gross members, prizes were won as follows: Don Woodworth of the Norge Corporation, first prize with a low gross score of seventy-eight. Second prize—Mr. Calvert of the Micromatic Hone Company with an eighty-six; third prize, Mr. "Pete" Peterson of the Kelly Reamer

(Continued on page 36.)

There's a COST-CUTTING OK CUTTER FOR MAJOR MILLING JOBS



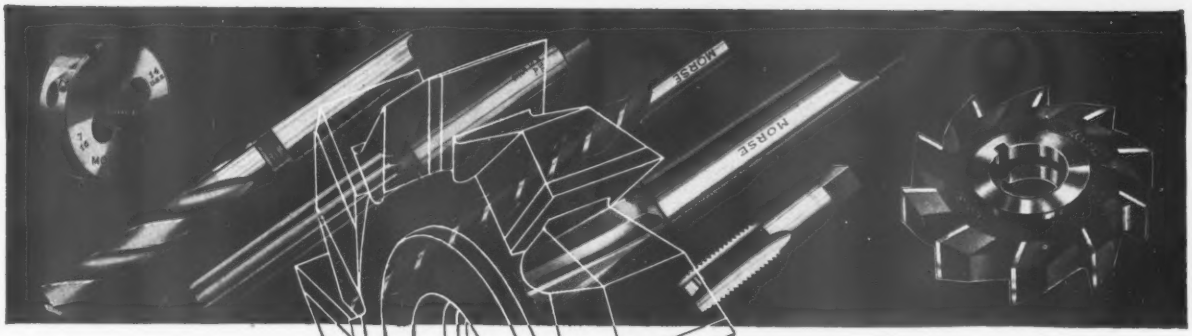
O. K. Milling Cutter Blades lock firmly in place without screws, pins or wedges. This allows for closer tooth spacing when necessary. Mating serrations in the blade permit adjustment in line of wear.

SOMEWHERE IN YOUR PLANT
THERE'S A NEED FOR O. K. CUTTER ECONOMY

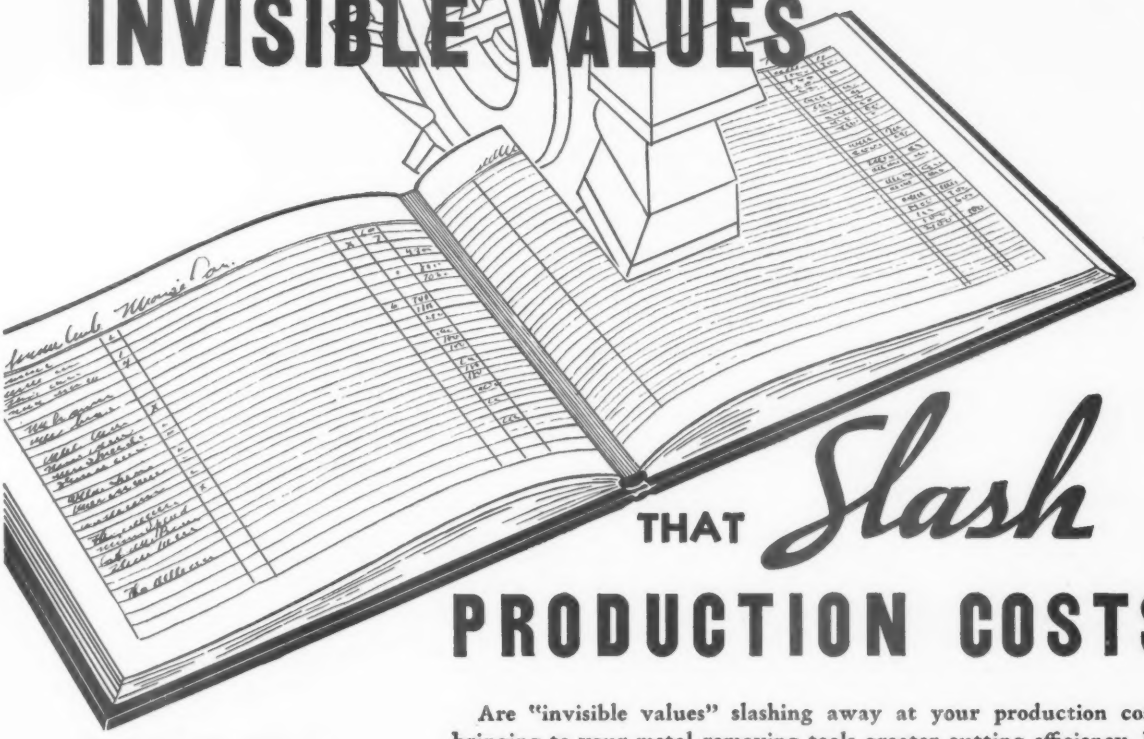
O. K. Milling Cutters are made in light, medium, heavy and extra heavy duty. Each has an economy message for the man whose profit margin demands a high, uniform level of production. Proof of this is the known fact that, once introduced into a department, O. K. Cutters rapidly become standard equipment . . . . simply because of their very *visible* ability to step up production. Without obligation or undue sales urge, we should like to send you an O. K. representative.

THE TRADE OK MARK SYSTEM
OF INSERTED-BLADE METAL CUTTING TOOLS

THE O. K. TOOL CO.
SHELTON, CONN.



INVISIBLE VALUES



THAT *Slash* PRODUCTION COSTS

Are "invisible values" slashing away at your production costs, bringing to your metal-removing tools greater cutting efficiency, less breakage, longer time between resharpening?

They are if you use Morse Tools. **The "invisible values" are Morse Extra Values — hidden superiorities in every tool that bears the Morse trade mark. In putting them there, years of manufacturing experience play a part. So does carefully-controlled heat treating. Unusually accurate grinding. Step-by-step inspection.**

Do you have doubts about a difference between leading brands of metal-removing tools? Then let Morse extra values prove themselves in your own shop. The Morse laboratory, with many years of tool engineering experience, will co-operate on any problem.

A Conveniently Located Morse Distributor Will Give You Prompt Service

The Morse Line includes:
High Speed and Carbon

DRILLS
REAMERS
CUTTERS
TAPS AND DIES
SCREW PLATES
ARBORS
CHUCKS
COUNTERBORES
MANDRELS
TAPER PINS
SOCKETS
SLEEVES

MORSE THERE IS A DIFFERENCE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD - - - MASS., U. S. A.

NEW YORK STORE - 130 LAFAYETTE ST. CHICAGO STORE - 570 WEST RANDOLPH STREET

NEW EQUIPMENT

The Sunnen Products Company of St. Louis, Missouri have developed a Precision Hone for grinding, honing and lapping holes in all kinds of metal except lead or babbit. No particular skill is required to operate and hold work within limits of .0001".

The Precision Honing Machine will handle any hole from .480" to 2.400" in diameter that is free from keyway and not more than 7" in length. Can be set up for any job one minute maximum time. Duplication of size is easily maintained by means of a micrometer stop graduated in .0001".

Mandrel revolution and stone feed-up are controlled by a foot pedal allowing the work to be removed from the mandrel instantly when foot pedal is released. When work is put back on mandrel, the grinding unit is brought back to duplicating position immediately by exerting pressure on the foot pedal.

The Precision Honing Machine is especially suited for assembly operations, short run production, tool room and experimental work, and general plant maintenance. Can also be used sizing regular production pieces where shaft or hole is under or oversize.

Danly Machine Specialties announces a new type flat rounded die spring, which develops an entirely new cross section for springs of this class. The new section is in the shape of a keystone with the smaller side to the center of the spring permitting, it is claimed, greater travel and greater strength. Two years were spent in testing types of spring steel and a special alloy steel developed which it is said by the manufacturer gives "practical ultimate in fatigue life." Special heat treating processes, utilizing three-zone furnace control and fixed oil quenching temperature are unusual features of their manufacture which are said to develop practically absolute uniformity in hardness and temper.

KWIK-COTE Copper Plate Solution.—This is a product of Grapho Products, Inc., 2232 Alvord Street, Indianapolis, Indiana. Kwik-Cote is a chemical compound which deposits a copper plating on the part to be treated by dipping or painting with a small stiff brush. Hair-line separation of hardness can be secured with positive results.

With Kwik-Cote, it is claimed, any portion of the part to be hardened can be treated. Preparation for hardening takes but a few minutes as the solution dries almost at once and can be placed in the carbur-

(Continued on page 33.)

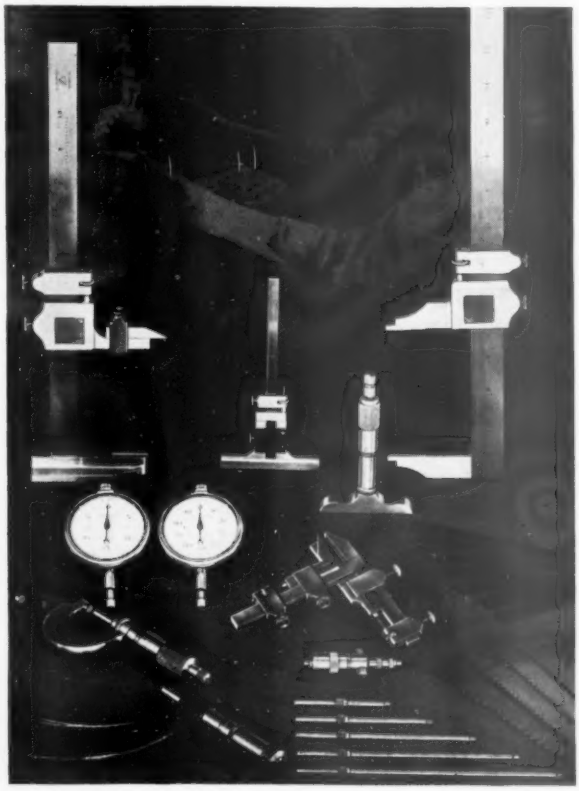
Specify **STARRETT**
when you buy

MICROMETERS
DIAL INDICATORS
VERNIERS
HACKSAWS

Write for copies of Starrett Catalog No. 25T and the special Starrett Dial Indicator Catalog T.

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
Athol, Mass., U. S. A.

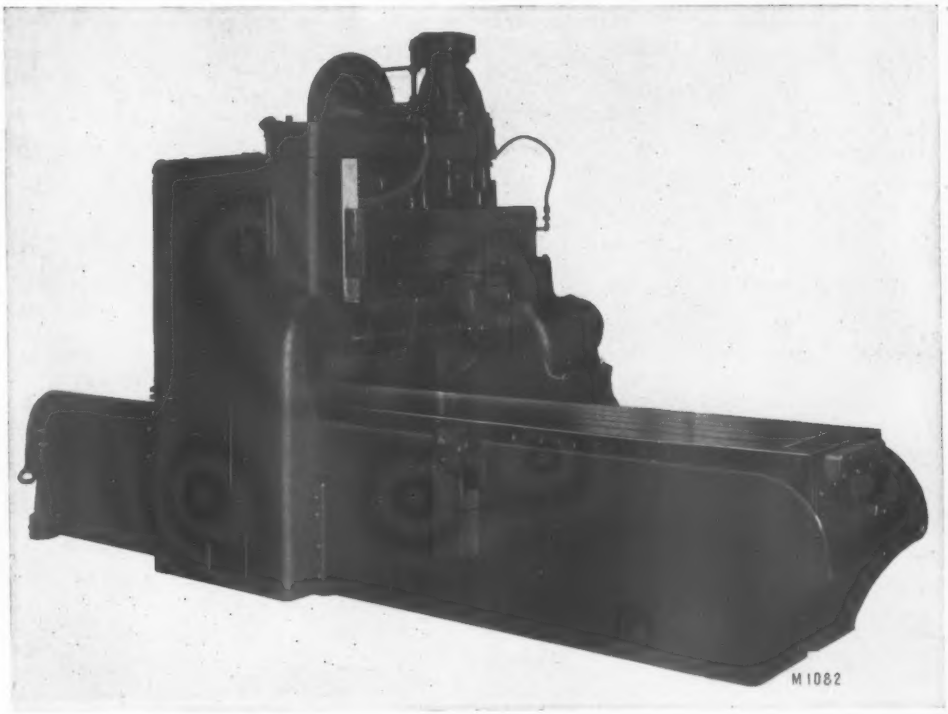
Use Starrett Tools



ENGINEERED PRODUCTION
EXAMPLES FROM THE SUNDSTRAND FILES
No. 3618

Lathes
Milling Machines
Tool Grinders
Centering Machines
Balancing Tools

Sundstrand Hydraulic Rigidmil Has Interesting Automatic Cycle



Eminently satisfactory performance of other Sundstrand machine tools brought to our Engineered Production Department a request for a proposal on a high production machine to mill five intermittent keyways in eight heavy shafts simultaneously. Depth of cut to be held within .002". The Hydraulic Rigidmil shown above is the result, and it is now operating in customer's plant with notable success. Most interesting is the complete Sundstrand-designed and built hydraulic equipment for this machine. Table has 72" of hydraulic feed and rapid traverse in both directions. Spindle-head has hydraulic rapid traverse up and down, hydraulic down-feed to accurate positive stop, and hydraulic clamps at both ends. Cycle is entirely automatic after starting, is accurately controlled by easily adjusted dogs. Head rapidly approaches work, feeds to depth and locks. Table feeds predetermined distance; then head unlocks, rises, table rapidly advances to position for next cut and cycle is repeated until all keyways are complete. Then table rapid traverses to starting position. Most interesting of all is the fact that the Sundstrand hydraulic circuit will take a *climb cut* if desired.

This machine is typical Sundstrand equipment — it produces accurate, well-finished work, cuts costs, increases production. Investigate Sundstrand Engineered Production for your milling and turning. Send drawings and data for reliable estimates.

SUNDSTRAND MACHINE TOOL CO.
2532 Eleventh Street, ROCKFORD, ILLINOIS, U. S. A.

RIGIDMILS - STUB LATHES
3-Wheel Tool Grinders - Centering Machines
Hydraulic Operating Equipment - Special Machinery

More Users, More Buyers, More Work

Time was when the Tool Engineer played but a minor part in the production of locomotives. However, the world moves along, and the railroads have caught the modern spirit with the rest. So, a new field opens for the designer of production tools, as the *hood* of the modern streamlined train covers the powerful automotive type engines that drive these annihilators of time and distance. Conceive an idea, create a demand for it, then produce it. That means more users, more buyers, more work and greater prosperity. And, *we have just commenced.*

That the Tool Engineer has an important place in the production of these locomotives goes without saying. The engines are built to precision standards, and the field is so wide that a comparative mass production is almost inevitable. Then, there are other units—radiators, instruments, air conditioning, radio and electric appliances—each of which will have to be considered from a viewpoint of tooling and production. Yes, we have just commenced, and the best is yet to be.

Courtesy—ELECTROMET REVIEW.

Placed in service on May 17th, the Green Diamond is making the regular run between Chicago and St. Louis in four hours and fifty-five minutes as compared with the fastest previous schedule of five hours and thirty minutes. This diesel powered train, built by The Pullman Standard Car Manufacturing Company for the Illinois Central Railroad, is another example of how reduction in weight through alloy-steel construction is helping to speed up schedules all over the country.

WE ASK YOU ---

Is the adjustment of the blades in your inserted tooth cutters *limited by mechanical construction?* It would *not* be if you were using GD & GD tools.

With this construction the blades can be located most advantageously to suit your grinding needs, yet are securely locked into place by the serration and wedge so they will not move under any clutching load.

THINK IT OVER.

GODDARD & GODDARD CO.

DETROIT

NEW EQUIPMENT

(Continued from page 30.)

izing pots immediately. A scleroscope hardness variation from 80 to 30 is secured. Threads treated with Kwik-Cote may be kept dead soft and in perfect condition while the remainder of the piece is hardened. Only the parts to be kept soft are treated.

It may be used between cams, back of gears, threads, in bores where stock is left for reaming after heat-treating, on springs and any section to be kept soft. The solution may be used as a base for nickel or chrome plating.

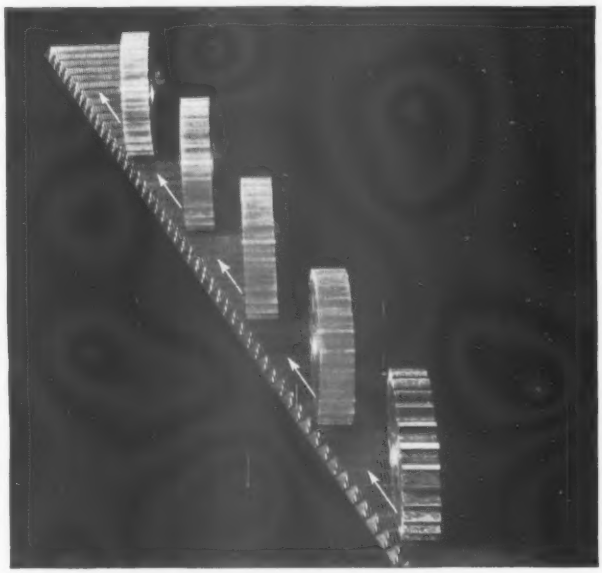
The J & L Automatic Thread Grinding Machine, recently brought out by the **Jones & Lamson Machine Company of Springfield, Vermont,** is a machine embodying a new grinding process. This machine is designed about the trueing device as the primary element. With no attention from the operator and without disturbing the size adjustment to which the wheel continually is set, the wheel is kept sharp continuously throughout its effective life. In consequence, metal is removed by a true cutting action in the form of microscopic chips instead of dust; and in further consequence, a remarkably high rate of metal removal is obtained without burning the work, and heavy cuts can be taken without sacrificing accuracy. The self-trueing, self-sizing mechanism of this machine brings thread grinding into the range of practical shop operations.

The standard machine is designed to grind up to and including threads 8 inches in diameter and up to and including a maximum thread length of 9 inches. This 9 inches of threading may be ground on any part of work 24 inches long. The standard machine is made to swing work of 11½ inches maximum diameter with a maximum work length of 31 inches between centers. The machine spindle is bored 1 $^{11}/_{16}$ inches in diameter to permit grinding up to 1⅝ inches in diameter on long work, such as shafts, etc., when held in a chuck. It will grind single, double, triple, quadruple, or sextuple threads within its range. The machine will grind from the solid or from previously roughed threads. 20-inch grinding wheels are furnished as standard equipment.

A rheostat is furnished and graduated to correspond with graduations on the wheel-trueing device so that, as the wheel decreases in size, the rheostat may be changed to maintain the proper peripheral speed.

An exclusive feature of the machine is the taper grinding attachment. By inserting a hardened steel former of the desired taper, the machine, without compensation for lead, will reproduce this taper on the work. Whatever the shape of the former, be it taper, combination of straight and taper, or double taper, this shape will be reproduced in the work. No compensation for lead is required under any conditions. A standard maximum of 1½ inches of taper may be ground on any portion, or over the entire length, of 9 inches.

The grinding wheel feed stops automatically when the correct size is reached, and the machine automatically compensates for the decrease in the size of the wheel after trueing.

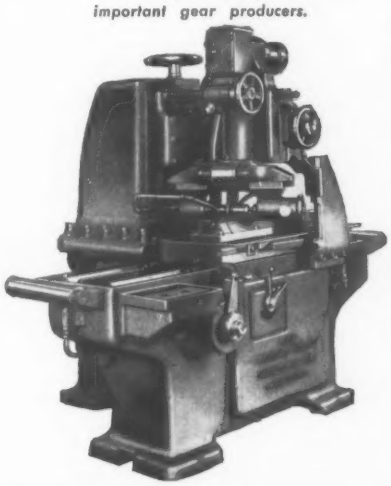


All gear design starts from a basic rack. That is why Michigan crossed axes finishing—using a rack—consistently produces more accurate gears.

"31,615 GEARS per SHARPENING"

Half-a-million or more per Rack

The Michigan Gear Finisher for helical or spur gears is now used by a majority of all important gear producers.



Minimum Tool Costs—the lowest for any finishing process—is repeatedly proven by the Michigan Gear Finisher through reports such as this one from a leading manufacturer. These two qualities—accuracy and lower gear costs—combined with flexibility, are important factors in the popularity of this machine among gear producers irrespective of production quantity.

MICHIGAN TOOL COMPANY

7171 E. McNichols Road · Detroit

GAGE TOLERANCES

(Continued from page 9.)

ber that in most cases the gage maker does not have a record of nor access to the operation. Therefore it becomes of vital importance both from the standpoint of cost and efficiency that the proper tolerance be specified.

A recent addition to the A.S.T.E. Data Sheets is eight pages of specifications for plug and ring gages. These were furnished by the Gage Manufacturers' Association and are standard with all members of the Association. The chart of physical dimensions of plug and ring gages is also what is known as the American Gage Committee Design and may be found in pamphlet "Commercial Standard CS8-33" published by the United States Department of Commerce, a copy of which may be obtained from the Superintendent of Documents, Washington, D. C., at 10c each.

The physical dimensions of plug and ring gages being well established, we should now take up the question of tolerance. The cost of a gage is directly proportionate to the tolerance or accuracy required. The engineer or designer very often specifies according to his own ideas without taking into consideration the requirements of the job. The manufacturing limits have been constantly reduced so that the design engineer is tempted to move the decimal point just one or two places to the left when specifying the gage, just to be safe. To the gage maker who takes this point seriously it becomes just one more headache.

HANDY ANDY'S WORKSHOP

(Continued from page 22.)

the boys will know exactly *who* to jump. And they do jump me plenty, don't kid yourself on that. Well, at that, we have one satisfaction—*The Tool Engineer* is being *read*. Of that, we have had ample evidence by this time.

• • • • •

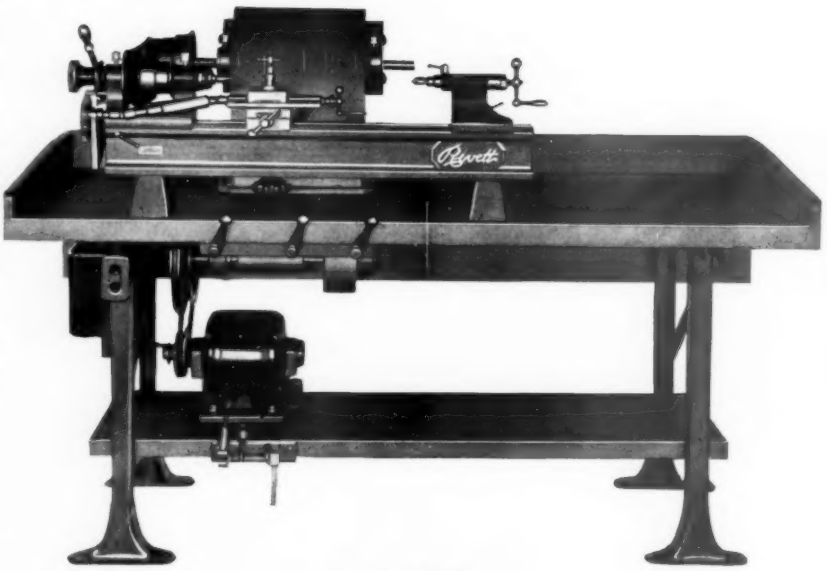
Naturally, we invite criticism, and sometimes we write articles for the express purpose of getting under our readers' hides, but, we much prefer articles of interest. We know that there is plenty of material available from you tool engineers, the trouble is to get it down in black and white. Well, men, this is a direct challenge! What are you going to do about it? Write in telling us what *your* suggestions are,—or better yet, write an article of the sort you think we ought to have? Do *your* job.

• • • • •

Somebody remarked that "a Tool Engineer is a genius on his seat but an ass on his feet." That, however, is not a blanket application. We have plenty of men who can deliver an excellent talk, not only on technical but on general subjects, and plenty of men who can write mighty interesting articles. Well, we want them. This is all in good fun and part of the game, to be laughed at over the dinner tables at the meetings. And that reminds me! Where's Bert Carpenter, with the ready smile and the personality—plus? Come on, Bert—let's hear from you.

RIVETT PLAIN BEARING BENCH LATHES

Built in five headstock sizes from ¼" to 1⅛", the Rivett plain bronze bearing bench lathes are suited for every tool room purpose. A complete line of attachments for turning, boring, milling, thread cutting, etc., are available for precision machining of small work. Shown at right with thread cutting attachment lever chuck closer, bench mounting and Horizontal Safety Drive providing 12 selective spindle speeds, 75 to 1275 r.p.m.



RIVETT LATHE & GRINDER, INC.
BRIGHTON,
BOSTON, - - MASS.

Bulletin 505PB

PRODUCTION PERSPECTIVES

(Continued from page 22.)

Gilbert & Barker Manufacturing Co. of West Springfield has had a promising six months despite the flood which stopped activities at its plant for several weeks. **Production of oil burners and gasoline station equipment is proceeding at a rapid clip.**

The Chicopee Manufacturing Co, the Assinof Co., the J. Stevens Arms Co. and the **B. F. Perkins Co. of Chicopee** are doing much better this year, officials report. One definite sign of this was the recent bonus distributed among its 600 employees by the Chicopee Manufacturing Co.

. . . . . .

From Harmony, Maine we hear that **fire destroyed** the **plant** of the **Monarch Machine Co.,** there and four other buildings doing total **damage of more than $100,000.** The company manufactures tools.

. . . . . .

James Glore was recently elected to the Board of Directors of the **Cincinnati Ball Crank Company of Cincinnati,** Ohio. **Glore** has been identified with this company for many years and at present **is Works Manager** for the company. **The Trailer Company of America** located in Cincinnati **will build three new additions** to its plant it is reported. One building will be an addition to the factory, another for a paint shop while the third will provide additional office space. **The Cocoran-Brown Company,** manufacturers of lamps and automobile equipment **will build a $50,000 addition** to their plant at 4800 Spring Grove Avenue.

. . . . . .

From Pittsburgh we hear the **"Westinghouse Order of Merit" was bestowed** on several of the Company's employees. **John E. Blankenbuehler,** plant engineer, and **Arthur E. Goodwin, tool designer** were among those to receive the high recognition. **Goodwin was honored** for his outstanding **work as a tool designer** in analyzing a manufacturing problem and for ingenuity in designing and development of paper coil winding, for specific accomplishment **in the application of compressed air jets** as a means of neutralizing the effect of windage from rectangular mandrels, thereby making the winding of very thin insulating paper satisfactory from the standpoint of practical manufacture.

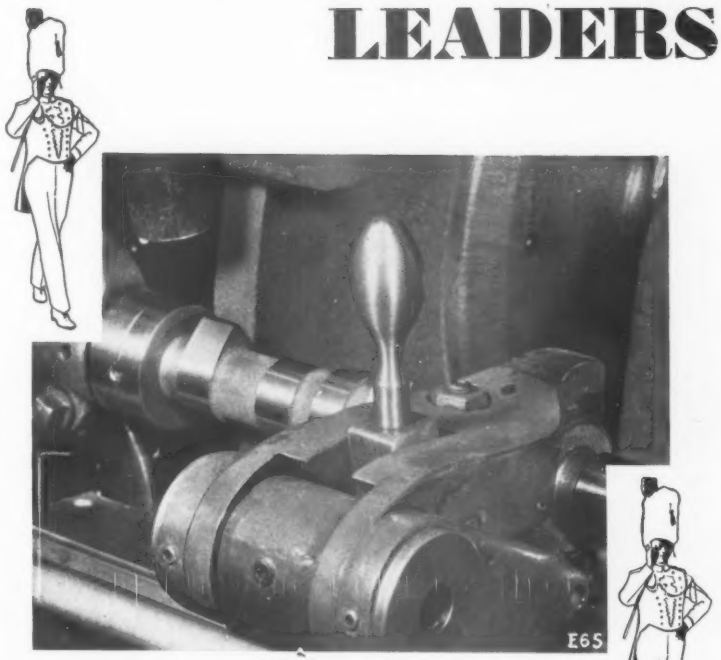
Pioneer Company Expands

Announcement is made by A. M. Sargent, President and General Manager of the Pioneer Engineering and Manufacturing Co., Detroit, of the purchase of the Cordua Engineering Co., also of Detroit. Mr. Owen Cordua, a die engineer of long experience, brings to the Pioneer company his organization of engineers especially trained in die design.

Reed-Prentice Corporation,

Worcester, Mass., have appointed Sterling-French Machinery Company, 423 New Center Building, Detroit, Michigan, as exclusive dealers for their complete line of Machine Tools consisting of Lathes, Die Sinking Machines, Vertical Millers, Die Casting Machines, Injection Plastic Moulding Machines, as of August 5, 1936. Charles E. French, President.

Used by the LEADERS



LEADERS in industry are leaders largely because the equipment and processes they use are the best obtainable. Landis 5" Semi-Automatic Hydraulic Cam Grinders are used by the leaders in the automotive industry. The efficiency of these machines is recognized not only in this country but wherever there is need of grinders of this kind. Repeat orders are proof of entire and lasting satisfaction.

Being Semi-Automatic in operation the Landis Hydraulic Cam Grinder requires little attention on the part of the operator. One man ordinarily operates two or three machines. If you manufacture camshafts you may safely rely upon the judgment of the recognized leaders in the industry. Doing this will point you in the direction of Landis Cam Grinders—and better cams.

100

LANDIS TOOL CO.
WAYNESBORO, PA.

A.S.T.E. ANNUAL GOLF TOURNAMENT

(Continued from page 28.)

Company with an eighty-six, and fourth prize to Mr. Bob Lindgren with a neat ninty.

Prizes for low gross, non-members were as follows: First, Mr. Harold Carmin with a seventy-six, second and third prizes to Mr. Larry Howe and Mr. Burl Sellers, each with a score of eighty-three. Twenty-five men participated in the kickers' handicap. Eleven prizes were awarded. A special prize was awarded for Lincoln Motor Car Company employees, as this company registered twelve men. Mr. "Doc" McKenzie won this prize. Ed. Beyma, A.S.T.Eer, won the prize for the most honest score for eighteen holes. Mr. Caton won the same prize for nine holes as did Dave Forsman. Players who made par on the club's toughest hole-No. 8—Mr. Calvert, Mr. Snell and Mr. McBrae. These men also "collected."

UNIVERSAL COLLET CHUCK

GRIPS AS STRONG AS SOLID STEEL

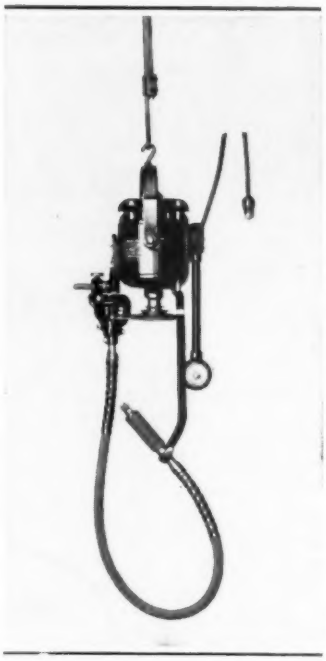
CONCENTRIC WITHIN .001

FOR END MILLS

UNIVERSAL ENGINEERING CO. FRANKENMUTH, MICH.

QUALITY Strand *SERVICE*

FLEXIBLE SHAFT MACHINES for the TOOL AND DIE MAKERS



This illustration shows our vertical machines with three speeds in capacities of 1/6—1/4—1/3 H.P.

Speed Combinations of 1700 3900 5200 or 3400—6000 10,400

We build over sixty types and sizes 1/8 to 2 H.P. Vertical and horizontal types.

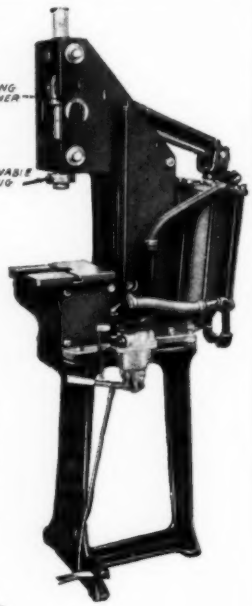
SEND FOR OUR COMPLETE CATALOG.

N. A. STRAND & CO.

5001 N. Lincoln St. Chicago, Ill.

"HOPKINS"

AIR OPERATED ARBOR PRESSES



- *Rapid and efficient operation*
- *Two bearings for the ram*
- *Hardened and ground fulcrum pins*

Made in 8 sizes varying from 1,000 to 18,000 lbs., these presses are constructed so as to give years of efficient service. Punching and assembling tools locate in a hole in the end of the ram where they are held by set screws. We shall be glad to send you a circular.

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624 N. Mechanic St.,
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HABERKORN & WOOD

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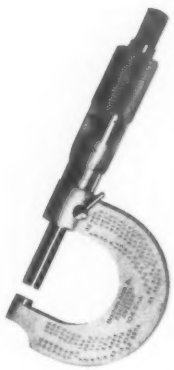
BEFORE YOU BUY SEND FOR BOOKLET "B"

SWEDISH GAGE MICROMETERS

HAVE HARDENED, GROUND AND LAPPED LEAD SCREWS.

ACCURACY DEFINITELY GUARANTEED.

OTHER EXCLUSIVE REFINEMENTS.



SWEDISH GAGE CO.
OF AMERICA

7310 WOODWARD AVE., DETROIT, MICH.

De-Sta-Co Toggle Clamps

TWELVE *different* STYLES *and* SIZES

In this illustration is shown a cold drawn steel bar held in place for drilling and reaming operations by the pressure of De-Sta-Co Toggle Clamps. This job was designed for small quantity production and the top plate in the nest has been hardened to act as a master drill guide.

De-Sta-Co Toggle Clamp is a dependable device for holding production articles, such as metal parts, stampings, castings, forgings and similar pieces in a jig or fixture during subsequent operations.

Send for literature.

DETROIT STAMPING CO.
3465 W. FORT ST. DETROIT, MICHIGAN

HANDEE TOOL OF 1001 USES

De Luxe Model

GRINDS CARVES POLISHES ENGRAVES DRILLS SAWS

● Unmatched performance — a sensation wherever used, in experimental laboratory, model and tool room, on the production line in large and small plants—making, shaping, polishing all metal products, alloys, glass, composition materials, wood, stone, etc.

Use this amazing tool for difficult precision jobs and hard-to-get-at places on intricate machine parts without removing the parts or dismantling machine. 200 different accessories available.

$18.50 Postpaid 6 Accessories Free

Fastest and most powerful tool for its type and weight ever developed. 25,000 r.p.m. Weight 12 ounces. Almost human in its smooth, rapid response. Try a Handee! Test for yourself its marvelous efficiency.

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UNBRAKO HOLLOW SET

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FREE SAMPLES OF BOTH SET & CAP

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All mechanics use their fingers driving Screws.

Knurls gear fingers to head; fingers, therefore, have better purchase, drive faster and further.

Pliers bite the Knurled "Unbrako," but slip on Smooth-Heads.

Remember: The Knurled "Unbrako" is the only Socket Head Cap Screw that can be locked when countersunk.

The Knurled "Unbrako" looks trim and attractive and dolls up any piece of machinery.

U. S. & Foreign Pats. Pending

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STANDARD PRESSED STEEL CO.
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BOX 100

BRANCHES: BOSTON, CHICAGO, DETROIT
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A New Gauge

Send for Catalog 51

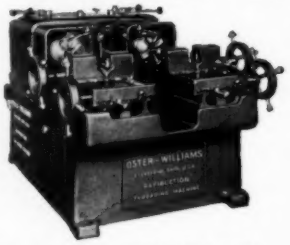
AMES Shockless Gauge

B. C. AMES CO.
Waltham, Massachusetts

453

PRODUCTION BOLT THREADER

Designed to handle a wide variety of standard and special work. Built in two sizes . . . No. 915, capacity ⅜″ to 1½″; No. 922, capacity ⅛″ to 2¼″; and in two types . . . . single and double-spindle. Spindle speeds range from 32 to 298 R. P. M. Double-spindle machine can be equipped with mechanical reverse for one spindle for cutting right and left hand threads simultaneously. Write for complete details!



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VERSATILE
ACCURATE

THE OSTER MFG. COMPANY

OSTER THREADING EQUIPMENT WILLIAMS

● Sales Office: 2063 East 61st Street, Cleveland, Ohio. ● Factories: Erie, Penna., and Cleveland, Ohio.

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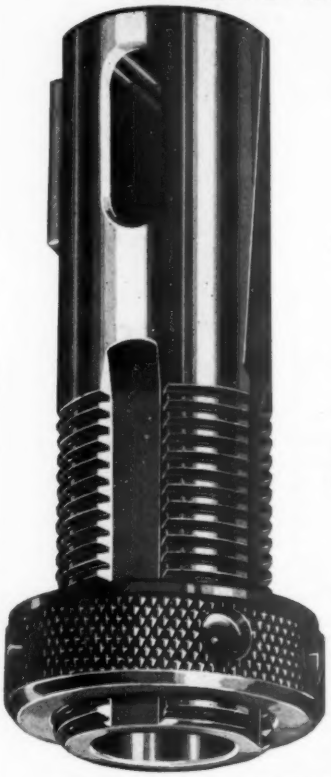
FOR MULTIPLE SPINDLES



STANDARD EQUIPMENT FOR ALL DRILLING REAMING AND TAPPING MACHINES.

ADOPTED AS STANDARD BY LEADING AUTOMOTIVE AND MACHINE TOOL MANUFACTURERS.

Utility Tools

THE J. C. GLENZER CO.

6463-6477 EPWORTH BLVD.

DETROIT, - - - - MICHIGAN

One Jump Ahead of the Operator!

That's the Rollway pump, always. Maintains at all times a vacuum of from 5 to 10 ft., depending on pump size. Never loses its prime.

Engineering Data Sheet

Send for Data Sheet for your files. If you want to handle lubricants or coolants economically and with fewest service interruptions, you'll want this Rollway sheet for reference.

PIONEER

Engineering and Mfg. Co.

35 MELBOURNE AVENUE DETROIT, MICHIGAN

Also Centrifugal and Hydraulic Pumps

FORMER FACTORY EXECUTIVE—

with five years successful experience as manufacturer's representative in Detroit territory—desires an additional line. This is an experienced, *seasoned*, capable man of proven selling ability, who is seeking another connection to complement his present line.

Address Box 24—*The Tool Engineer*

UNIVERSAL STANDARD DRILL BUSHINGS

MADE TO A. S. A. SIZES

LOWEST COST -:- LONGEST LIFE

UNIVERSAL ENGINEERING CO.

FRANKENMUTH, MICHIGAN

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Rivett Lathe & Grinder, Inc.	34
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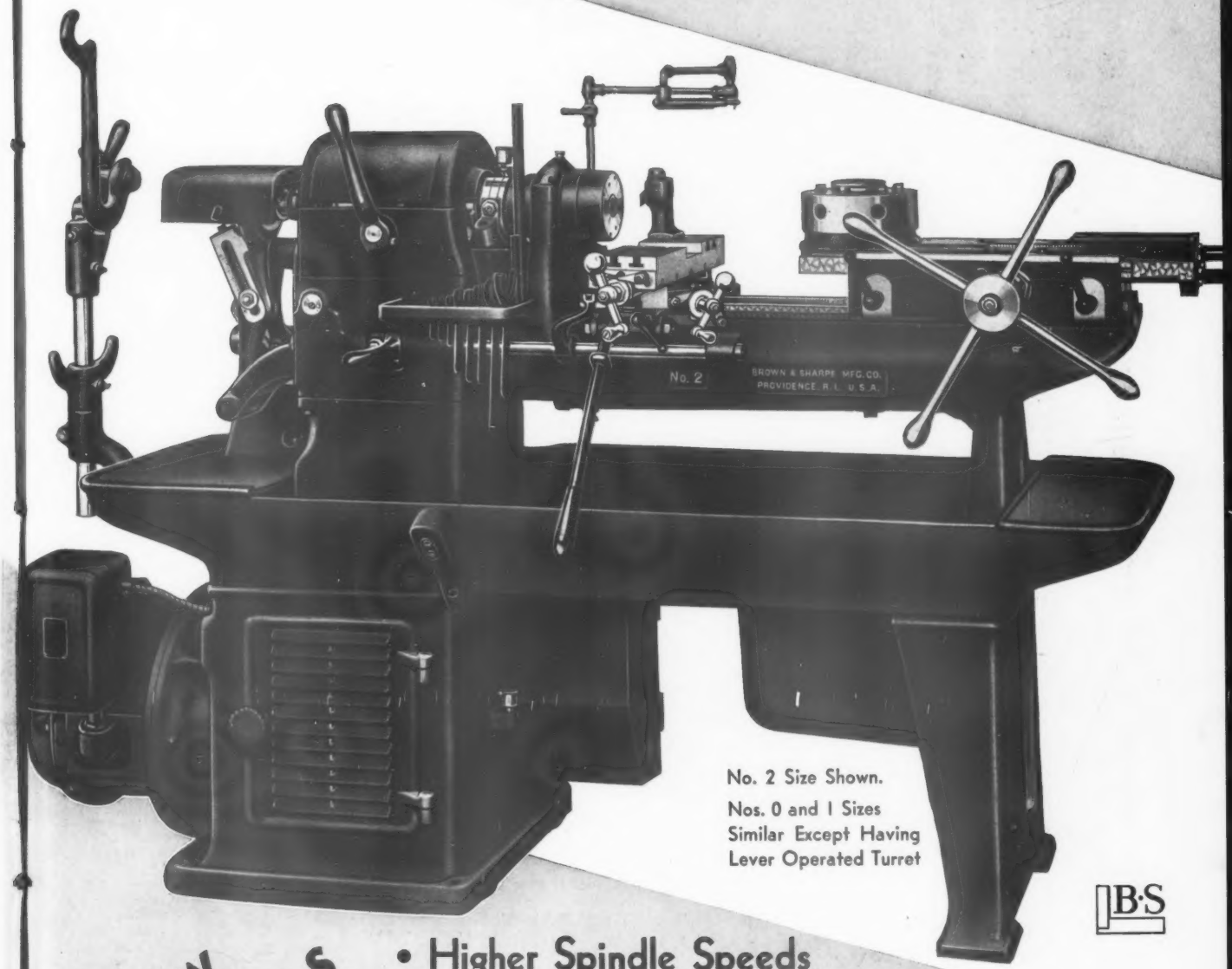
Sterling-French Machinery Co.	23
Strand, N. A. & Co.	36
Sundstrand Machine Tool Co.	31
Swedish Gage Company of America	36
Tomkins-Johnson Co., The	36
Union Carbide and Carbon Corporation	3
Universal Engineering Co.	36 and 38

The New Design

BROWN & SHARPE

MOTOR DRIVEN - WIRE FEED SCREW MACHINES



No. 2 Size Shown.

Nos. 0 and 1 Sizes Similar Except Having Lever Operated Turret

B·S

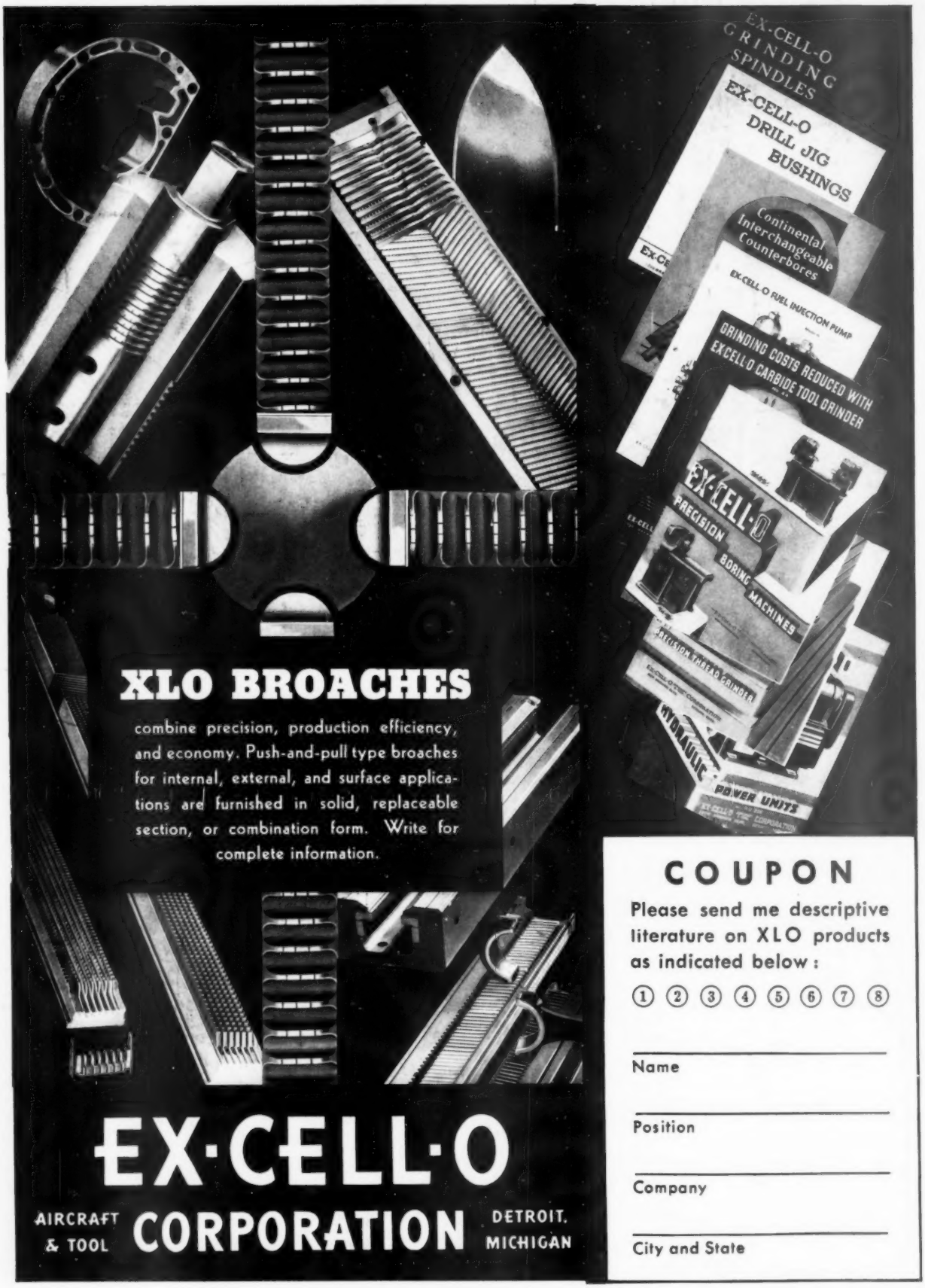
NEW FEATURES

. . . profitable on Short Runs or Second Operations

- Higher Spindle Speeds
- Broader Range of Work
- High Ratio between Low and High Speeds
- Chain and Sprocket Drive for Low Speeds
- Positive Clamp for Turret Slide Bed

Also available in Belt Driven Types — May we send details?

Brown & Sharpe Mfg. Co. Providence, R. I. U. S. A.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Continental Interchangeable Counterbores
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